PROGRESSIVE ARCHITECTURE

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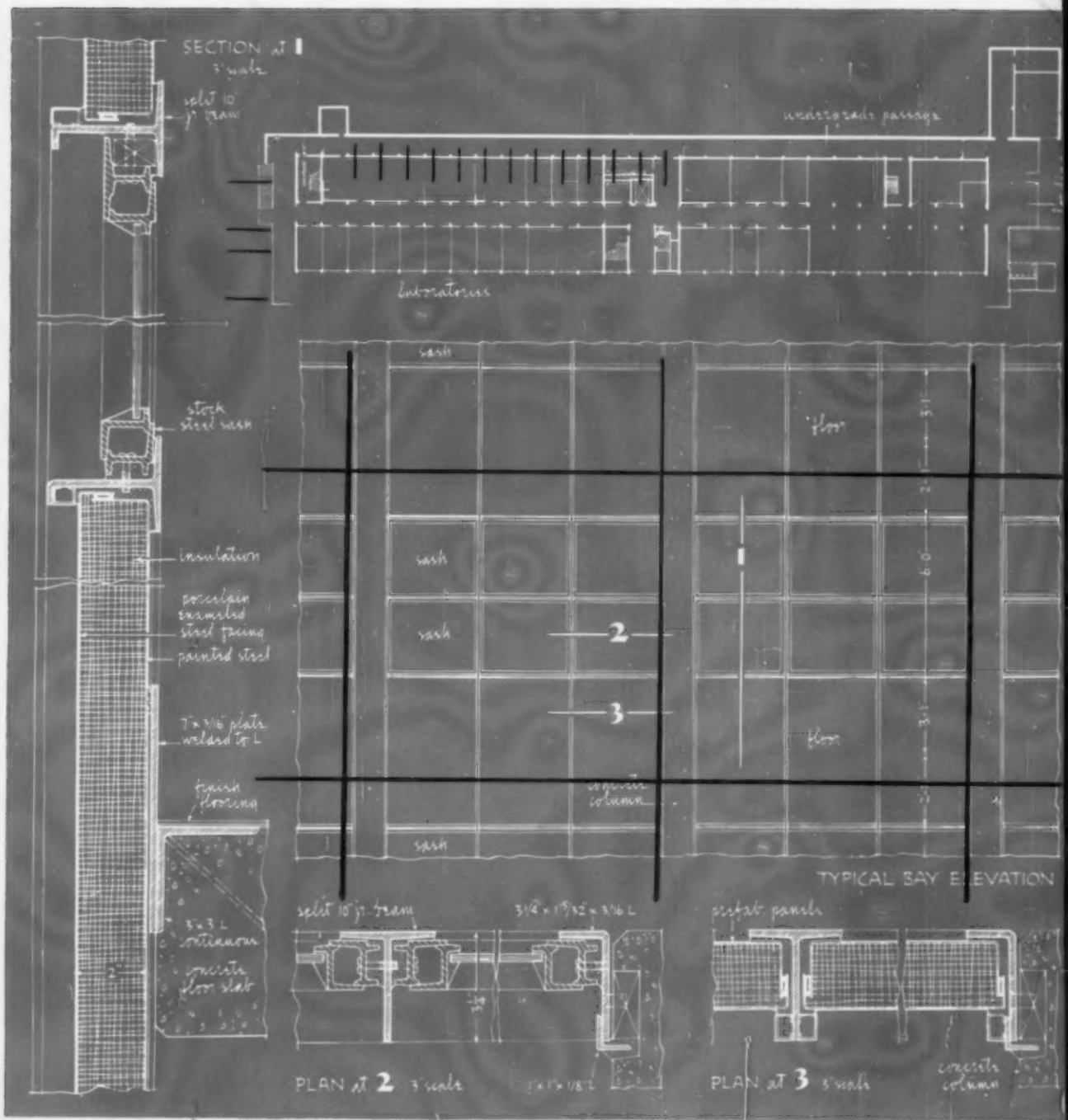

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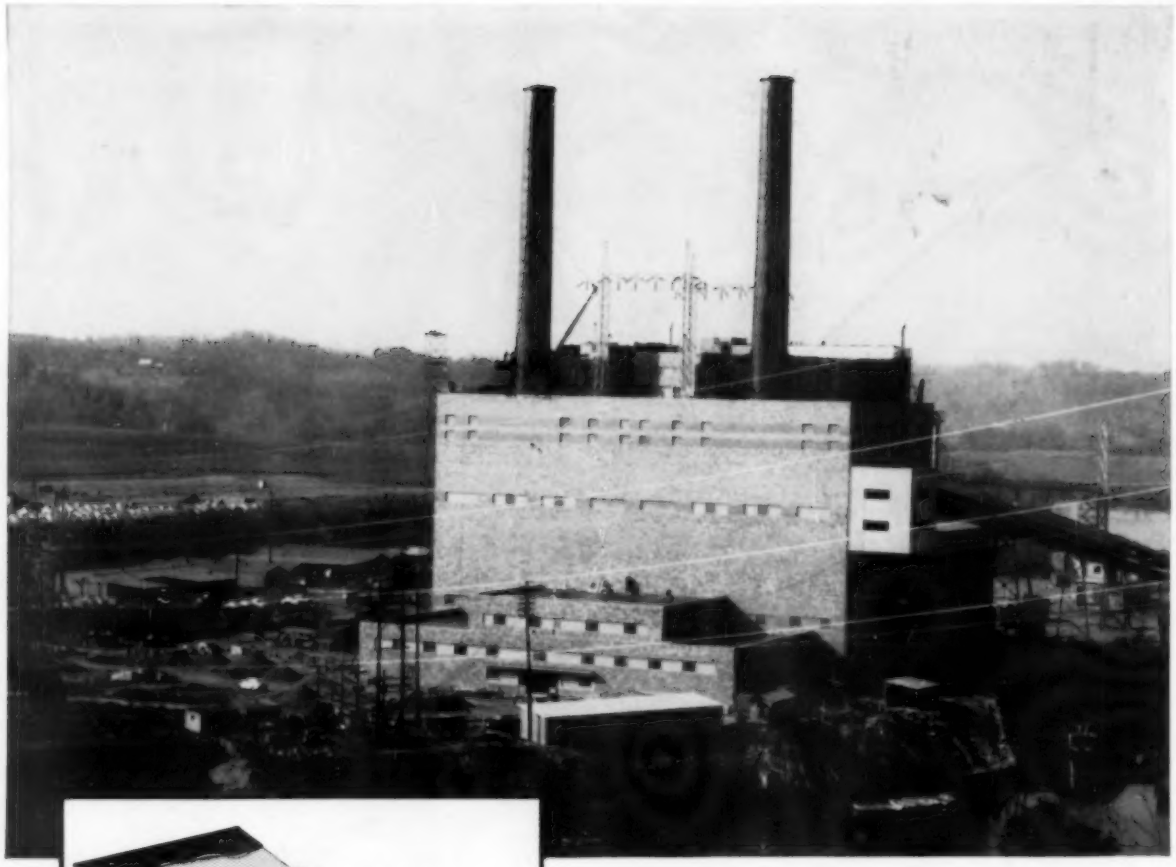

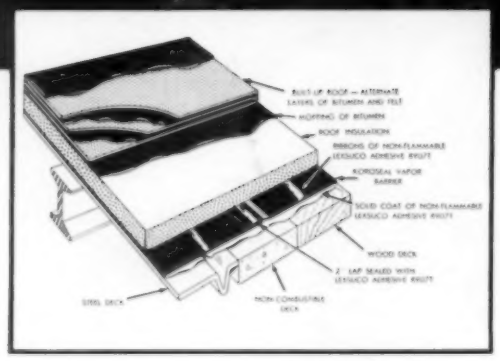
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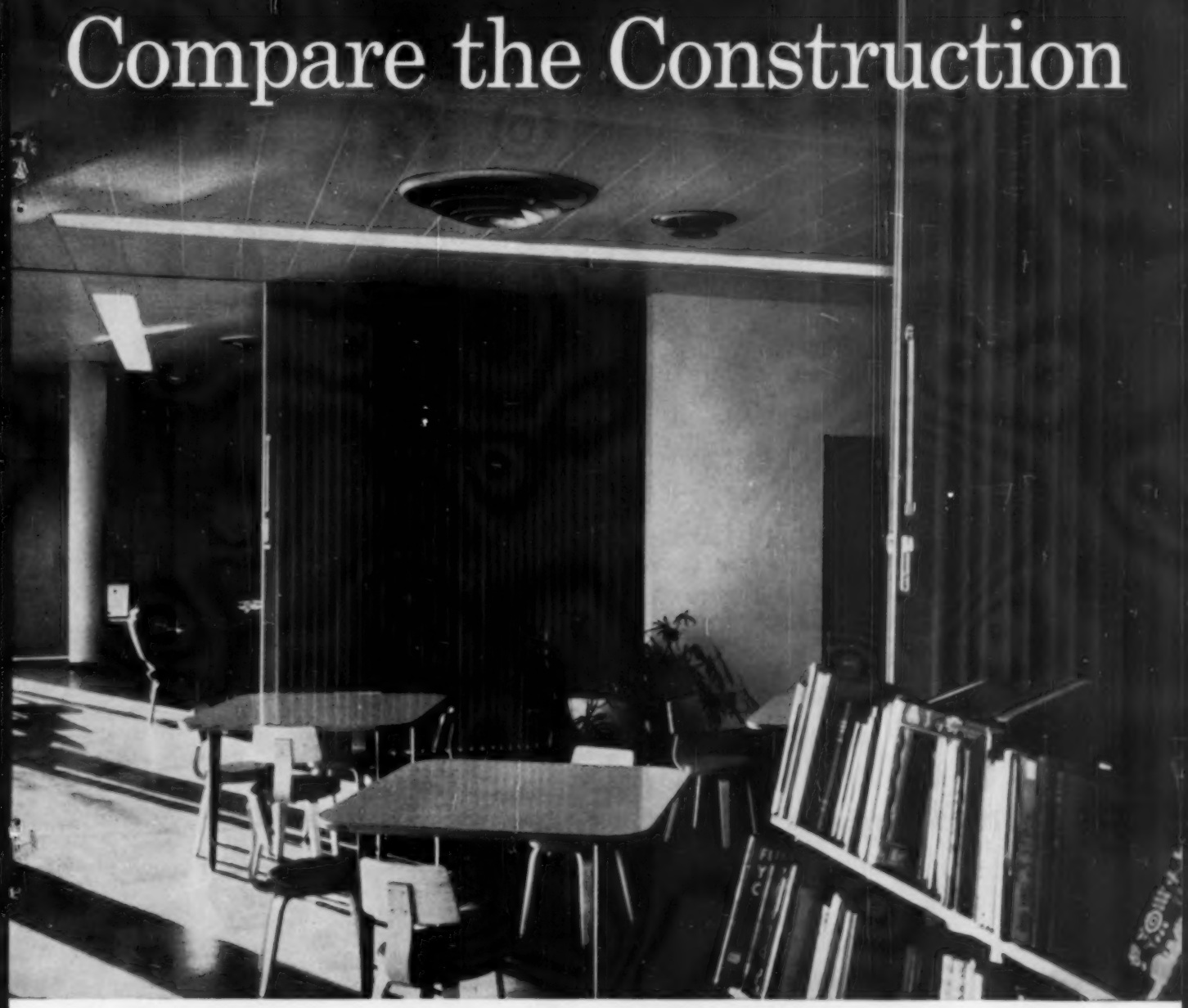

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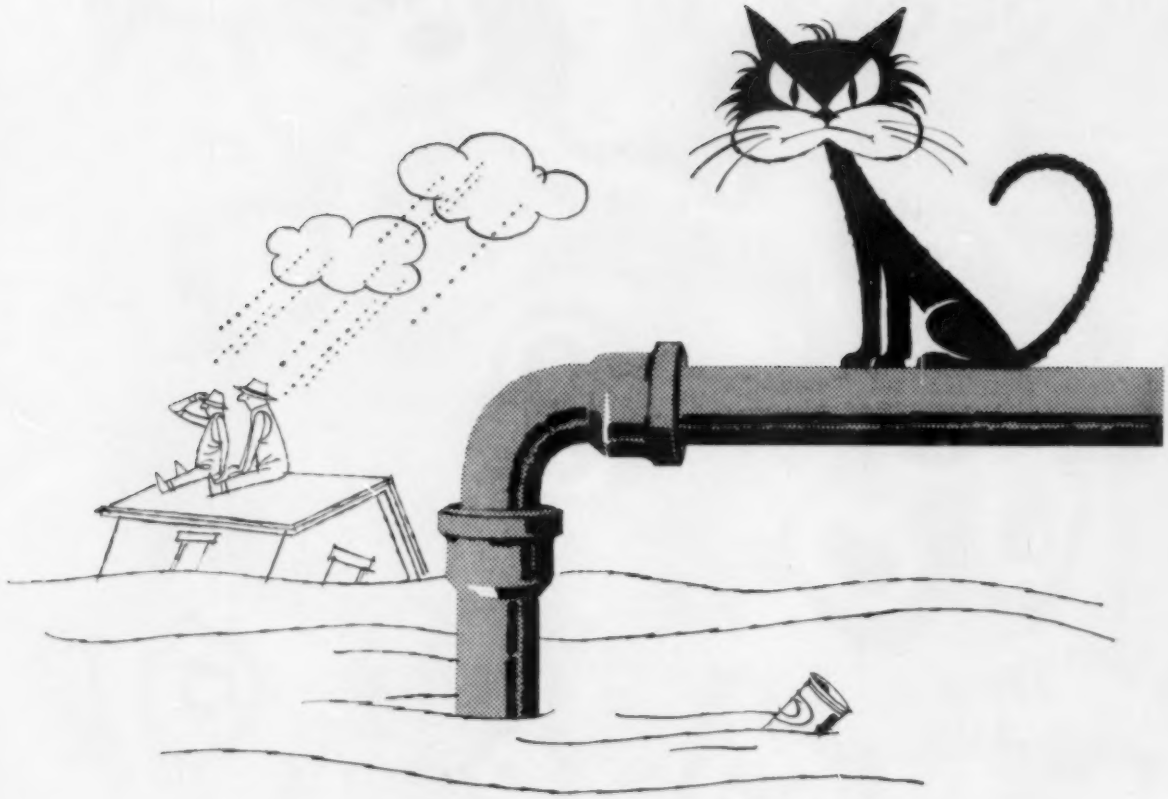

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November 1957

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Published monthly by REINHOLD PUBLISHING CORPORATION, 430 Park Avenue, New York 22, N. Y. Second-class mail privilege authorized at New York, N. Y. Additional entry at Brooklyn, New York. Professional subscription — $5. (For full data, see page 13)
Volume XXXVIII, No. 11

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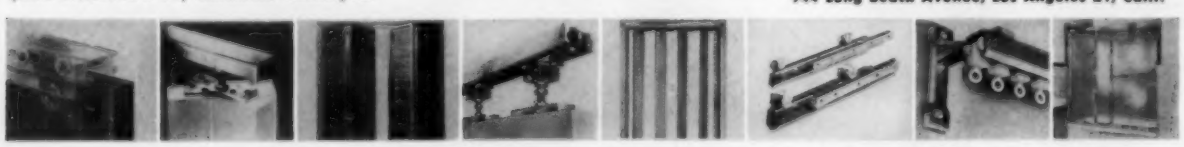

It's the Law *by Bernard Tomson*

P/A Office Practice *article discussing extension of the Architect's role as arbitrator between Owner and Contractor.*

Can a valid contract between Owner and Contractor provide for the final and conclusive determination by the Architect of all disputes (without the necessity of resorting to arbitration); including a dispute as to the construction and interpretation of the plans and specifications prepared by the Architect? A recent New York decision *(Board of Education of Union Free School, District No. 1* vs *A. Barbaresi & Son, Inc.)*, has answered this question affirmatively.

In the New York case, the General Contractor contended that the plans and specifications of the Architect did not require him to install a certain type of ceiling in the auditorium of a school under construction, but rather that this installation was within the province and responsibility of the Electrical Contractor. The contention of the General Contractor was based, in part, upon the fact that the only union that would make such an installation was the electrical union. The Architect, on the other hand, directed the General Contractor to make this installation, ruling that the plans and specifications which the General Contractor undertook to execute, provided for such installation by him.

The General Contractor demanded of the Owner that the decision of the Architect be arbitrated, as provided by AIA "General Conditions" which had been incorporated into the contract by reference. The Contractor relied on *Article 39* of the "General Conditions," which states that an architect's determination "relating to the execution and progress of the work or the interpretation of the contract documents" shall be subject to arbitration.

The Architect and the Owner were advised by this columnist that the contract (which had been originally prepared by other attorneys), contained language which could be construed so as to supersede the provisions of the "General Conditions" and which, in substance, would make the Architect's decision final and conclusive. The owner thereupon refused to arbitrate with the General Contractor, and the latter instituted a legal proceeding to compel arbitration.

The contract between the Owner and the General Contractor contained the following language:

"All work under this contract shall be done to the satisfaction of the Architect, who shall at all times have access to the work and who may order the dismissal of such workmen as he may deem incompetent or careless, or may require the Contractor to remove from the premises such materials or work as in the Architect's opinion are not in accordance with the specifications, and to substitute therefore, without delay, other work and materials, and the expense of doing so and of making good other work disturbed by the change, shall be borne by the Contractor. The Architect shall also determine the amount, quality, acceptability and fitness of the several items of work and materials which are to be paid for hereunder. *He shall also determine whether the said plans and specifications have been fully complied with by the Contractor. The determination of the Architect in all of such matters shall be final and binding upon the parties hereto.* Such determination in case any question shall arise, shall be a condition precedent to the right of the Contractor to receive any money hereunder."

The contract, however, did not provide that the written portion thereof was to supersede any conflicting provisions in the AIA "General Conditions" but rather stated that these provisions were to be "read together."

The Lower Court ruled that the written portion of the contract superseded the AIA "General Conditions" which were incorporated by reference, and that, therefore, the Architect's decision was final and binding. Upon appeal to the Appellate Division of the Supreme Court, this decision was affirmed, with a minority of the Court dissenting. The minority opinion did not assert as invalid the clause which makes the Architect's decision final. It merely argued that the two clauses were not inconsistent, stating:

"The dispute between the parties involves the question whether the appellant is required under its contract with respondent to install certain fixtures at its own expense and requires for its determination an interpretation of the contract documents. As to such interpretation, *Article 39* of the "General Conditions" of the contract for the construction of the buildings (American Institute of Architects) provides that the decision of the Architect shall be subject to arbitration unless the contract documents expressly provide otherwise. Paragraph III of the "General Constrution Contract No. 1" provides that the decision of the Architect, as to the amount, quality, and acceptability of the work and material, and as to whether the plans and specifications have been fully complied with by the Contractor shall be final. The general contract further provides that in case of conflict or inconsistencies between the contract and those of the specifications or any other contract document, the contract and all such documents shall be read together. If the provisions of the general contract are read together with those of the other contract documents, we see no inconsistency between the two provisions above referred to, giving to each full force and effect, and interpreting the entire contract in such manner as to make all parts of it effective. Paragraph III of the general contract, in so far as it makes the architect's decisions final, is limited to the performance and execution of the work in cases which do not involve questions of interpretation of the contract documents. Article 39 of the general conditions relates to a dispute such as that which is involved here, requiring interpretation of the contract documents. The dispute is arbitrable, there being no express provision to the contrary in such documents."

Increasing the scope of the Architect's authority in respect to his status as an arbiter of disputes between the Owner and Contractor may be desirable for many reasons. The Architect is not only knowledgable of the factual issues involved, but his determination of disputes can be speedy, thereby avoiding delay in the construction of the project. Further, the power to determine disputes is an effective weapon in the hands of the Architect in respect to his supervision of the project and his supervision of the Contractor. The extension, however, of the area in which the Architect may determine disputes between Contractor and Owner, involves both ethical and legal considerations. These considerations should be weighed by the profession as I have previously urged *(see* MARCH 1950 P/A, OCTOBER *and* NOVEMBER 1951 P/A, FEBRUARY 1952 P/A, SEPTEMBER, OCTOBER, *and* NOVEMBER 1953 P/A, *and* JUNE 1954 P/A).

The New York decision is of great importance to the profession, and may be further appealed. If such an appeal is taken, a further report will be furnished as to the ultimate determination.

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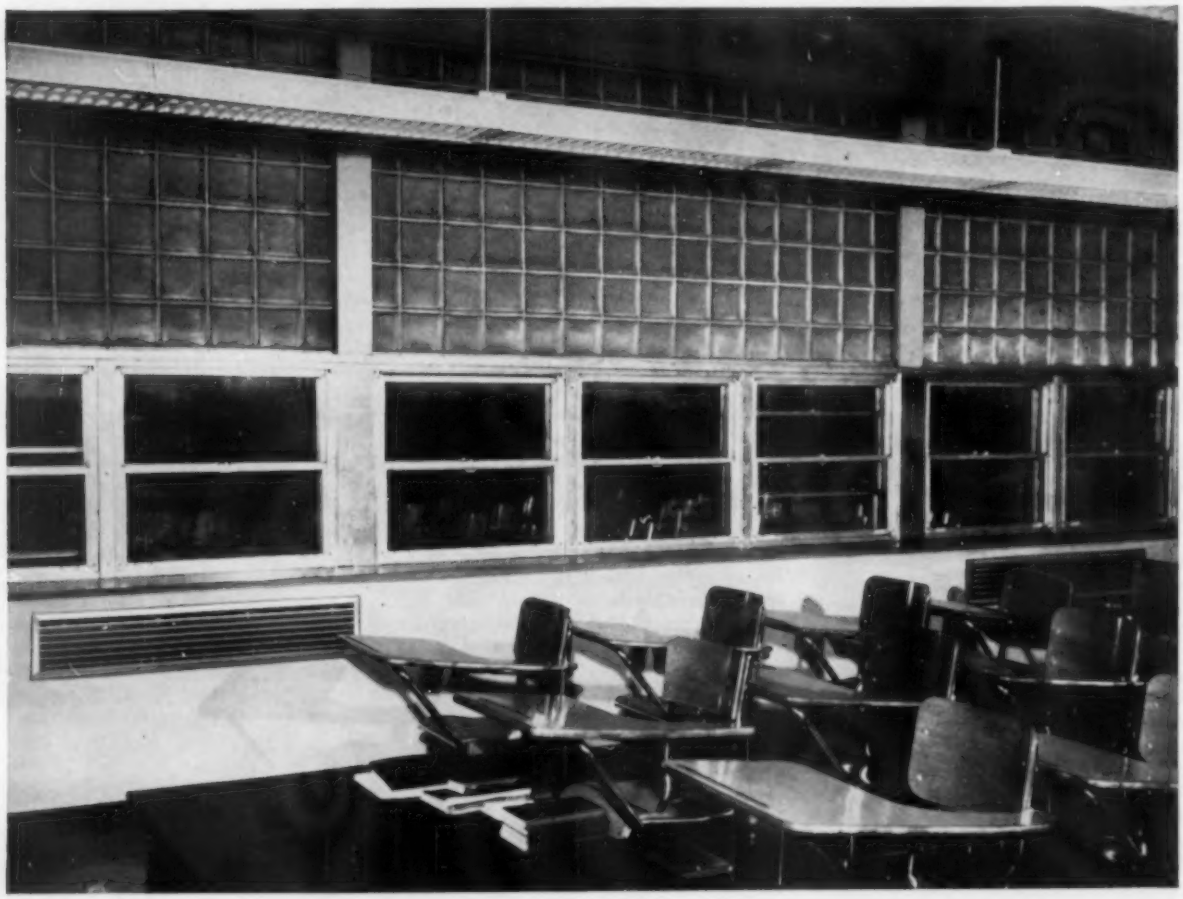


Mechanical Engineering Critique *by William J. McGuinness*

P/A Office Practice *column on mechanical and electrical design and equipment, devoted this month to the use of floors for radiant heating and cooling by air.*

In the design of heating and cooling systems using warmed or chilled air, the tendency now is to deliver air to the conditioned space after it has passed over the far surface of the ceiling or floor and then take it back to the conditioner. Early in the current decade, it was common in *heating* systems of this type to use air to raise the temperature of radiant surfaces and return it to the equipment center without passing it through the room. The newer method retains the advantage of radiant effect and has many others. Control of humidity, addition of fresh air for ventilation, and elimination of dust by filtration are some of them. A faster response is assured. Radiant cooling is possible only when room humidity is reduced. This can be done only by conditioning the room air; otherwise moisture would condense on the chilled surfaces.

The choice between floor or ceiling as the radiant surface is made by the architect. As soon as preliminary sketches that fix the general design are approved, it will be apparent whether floors or ceilings must be used. Certain types of building dictate the choice to be made. In multistory office buildings, for example, the ceiling must be used* One-story buildings with slabs on the ground, however, need floor systems to combat cold floors in winter. Roofs of folded concrete and other irregular construction often preclude the use of ceilings.

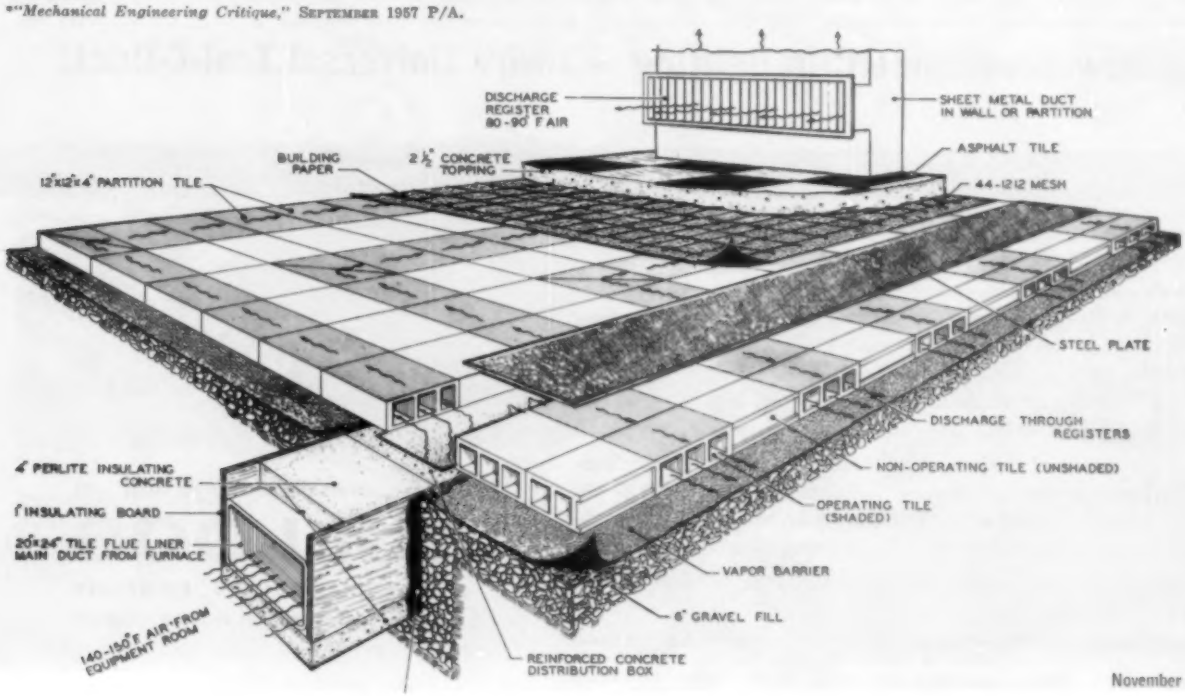
Architect Percival Goodman and Mechanical Engineer John Dillon have adapted this system, using floors, to a new temple at Beechwood Village, Ohio. Dillon is a pioneer in the field of radiant conditioning by the use of air and has engineered many successful installations. Temple Anshe Chesed is a campus-type complex, mostly one story, embracing worship, education, social, and administrative activities. Seating for worship can be varied from 500 to as many as 5000 during high holidays. Air conditioning is a future consideration which the present duct system will accommodate when installed. An open plan with a folded roof and much high glass made it necessary to use floors for both air distribution and as radiant surfaces.

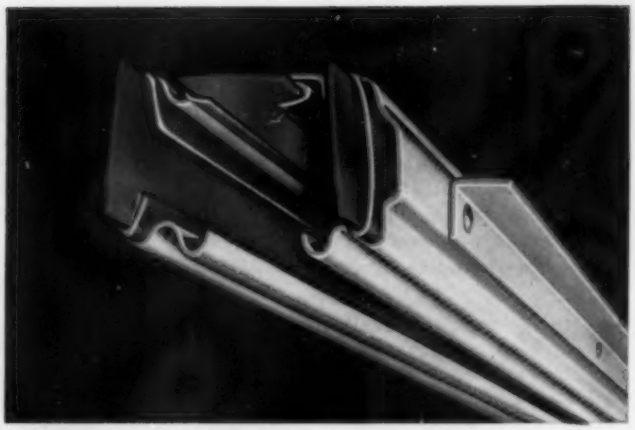
The prime source of heat is steam. Central air-handling units convert to warm air which is delivered through a grid (*as shown*). Over a layer of gravel and a vapor barrier, air is circulated through insulated mains of standard terra-cotta flue liner to plenum spaces capped by steel plates supporting the concrete floor. Two four-in. layers of perlite insulating concrete and one in. insulating boards surround the main duct. Laterally from the plenums, air flows through conventional three-cell terra-cotta tile, four in. thick. It is discharged to the rooms through perimeter floor registers below glass or through low or high registers on interior walls. Some low registers (*as shown*) have alternate high registers above for use with air conditioning. It is sometimes better to deliver cool air from high positions. All registers have adjustment for correct air balance. Air is taken back from a number of central points through grills or through mushroom heads below seats to return ducts of flue tile similar to and at the same level as those which deliver the air. There is no crossing between supply and return tiles.

The varied occupancy suggests the use of numerous zones. Fifteen air-handling units serve 20 zones. This helps to reduce the size of the mains, the largest of which is 20" x 24".

In any radiant-heating system the air temperature in the room can be less than in other systems which do not raise the mean radiant temperature of the room surfaces. Lower air temperatures save fuel. Special comfort is usually attributed to radiant heating. Air in ducted systems should not be delivered to the room at more than about 120 F, yet it can enter radiant chambers at 140 F. The greater temperature differential reduces the rate of air delivered to the room. This makes it possible to use smaller air passages. Air enters the room at a mild 90 F. Corresponding advantages attach to the operation for cooling. It is thought that the cost of installation is no greater than that of other methods. Indeed, the heating contract is generally less, but adjustment must be made for the additional masonry work in the general contract.

*"*Mechanical Engineering Critique," SEPTEMBER 1957 P/A.





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Architectural Samples Exhibits Now Big Business—Part 2

by Rosalind Cohen

P/A Office Practice ***article continuing a report of the current boom in architectural samples exhibits, and relat. l building business activities.***

In 1955, another type of exhibit center was established in Washington, D. C. Conceived and financed by National Association of Home Builders, National Housing Center is ideally situated for its function as NAHB headquarters; as a professional gathering place for manufacturers, architects, and decorators; and as a showcase for tourists. Programs and courses are prepared for prospective home-buyers. Dramatic displays of unusual interest are arranged to attract tourists. Four display floors, in the seven-story building are open to the general public and exhibit the latest in home-equipment and materials. Exhibits, based on a 4'x4' module, utilize contemporary display techniques in a unique spatial arrangement of see-through walk-through display booths. Exhibiting manufacturers have free access to conference rooms and auditoriums. Other services include a library of housing data and information center. Visitors are given a classified directory and list of exhibitors, as well as a guide to exhibits. They are asked to indicate on cards whether they are home-owners, members of the building professions, or students—so that displays can be directed accordingly. This project is not chiefly a business enterprise: total income from space sales covers maintenance of the exhibit only, while the reference services and other facilities are supported by the NAHB, which occupies a complete floor of the building. Key factor in this project is its location in the nation's capital, where numerous professional societies maintain headquarters. The NHC was to function primarily as a conference center where builders, architects, manufacturers, urban planners, and designers would endeavor to solve mutual problems co-operatively; but, thus far, discussions have concentrated on real-estate problems such as urban renewal, credit, costs, mortgages, appraisals, construction, and labor problems. As for the samples exhibit, good attendance is assured by the continual flow of national and international visitors.

In Los Angeles, an unusual architectural conception, elaborate professional services, luxurious features, and impressive aims underlie the Construction Industry Center, projected headquarters for the Building Contractors Association of California. The center will be composed of a 150,000 sq ft, 13-story office building, 13-story elliptical "Tower of Exhibits," Graphic Arts Center, and three-level parking facilities. It will house sales and administrative offices of product manufacturers, financial organizations, subdividers, architects, trade and professional organizations—in an effort to "integrate and streamline" the building industry.

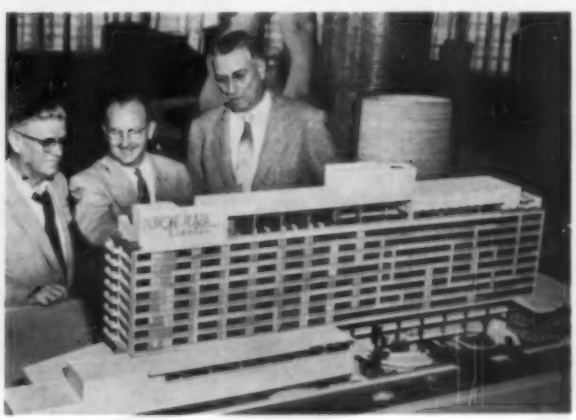
The building will feature facilities for closed-circuit TV and sound movies as well as many architectural novelties, such as an expandable auditorium for sales meetings. A bank and restaurant will cater to trade-association members, while a roof garden will accommodate the Greater Los Angeles Construction Club. For occupants and exhibitors alike, the center will maintain a Planning and Consultation department in addition to promotion, advertising, and publicity services. Special programs and services are intended for the layman as well.

The permanent "Tower of Exhibits," housing a complete range of building products, will have an all-glass elevator and glass-enclosed walkways at each floor to connect the tower and office building. Designed by Architect John C. Lindsay, the Center will be located at the edge of the Los Angeles freeway network.

In Miami, a plan to enlarge the facilities of the Architects' Samples Bureau culminated in the ambitious scheme for a multibuilding project, since dubbed Dupont Plaza Center and aspiring to

Exterior of National Housing Center, headquarters of NAHB, where exhibits for architects, builders, and buyers are displayed on four floors.

Examining model of multipurpose Dupont Plaza Center, Miami, are (below) *Frank Shuflin, one of architects for the exhibition/office/ hotel complex; Clinton T. Wetzel, president of Architects Bureau of Building Products; and AIA President Leon Chatelain.* Photo: Tierney & Killingsworth



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Architectural Samples Exhibits Now Big Business

become the construction center of the Southeast. The grouping comprises a luxurious 301-room hotel, on the shore of Biscayne Bay, an eight-story office building, and three-level, 100,000 sq ft exhibition wing, called the Architects' Bureau of Building Products. The office building, conceived as a "logical extension of contemplated service" will house representatives of manufacturing firms, who will supply technical information to architects. In order to accommodate the anticipated flood of visitors, the project merged with the operations of Tarleton hotel management.

Financed with a "record-breaking" loan by Massachusetts Life Insurance Company, this multibuilding project aims to be a special showplace and tourist attraction, as well as the building-industry headquarters of the area. The Architects' Bureau—headquarters for seven professional associations—will be thrown open to the public. Product demonstrations and special events based on regional architectural activities will be broadcast from TV studios in the Architects' Bureau. Architects, engineers, contractors, and product exhibitors will be housed in the office building. The hotel will have enclosed parking space, restaurants, swimming pool, yacht anchorage, cocktail lounges, convention halls, and the usual conveniences of a resort-convention hotel.

The Bureau will maintain a technical library and information center, with guides to point out individual displays planned by architects or industrial designers.

The scale of this project, scheduled to open next spring, is like COMAC, justified on the basis of anticipated need which depends, in turn, on population growth, rising construction activity, increased factory production, and the attraction of further business and industry to the area. In this case, the center is located in an area which also warrants exploitation as a resort; the question is whether the exhibits are warranted in a resort area.

Another type of exhibit gaining popularity in the construction field is the huge roadside showroom, in which national manufacturers aim their product displays directly to consumers instead of architects or builders.

One major project of this type is "Built-In Age" Architect's Display Building in Mountainside, New Jersey, which provides 27,500 sq ft of permanent-exhibit area, housing products for home construction, equipment for kitchens, and furnishing. This is the first of a series of such supermarkets for the building industry to be erected in major cities throughout the country. They are not retail outlets, as no actual selling is done on the premises. Such centers serve to bring together many manufacturers' outlets, usually scattered over a wide area and difficult for customers to reach. Here the customer can compare merchandise; an accompanying architect might point out features of equipment he plans to utilize.

Product displays designed and built by exhibitors, are arranged at random to show variety of available home products at once. Guides provide general information on products; for additonal information, the center maintains direct telephone lines to manufacturers' representatives. During a tour, visitors check cards indicating data they are interested in; these cards go to the manufacturer; the manufacturer sends them to local dealers; and dealers follow through with sales.

Many marketing and selling services are maintained for exhibitors: a complete network and closed-circuit TV studio where exhibitors can present new products to sales agencies across the country; intra-structure TV for group meetings in conference rooms; camera, microphones, and kinescope facilities. A publicity and promotion service will sponsor a series of home furnishing and decorating forums for women's groups interested in specific design problems.

For architects, the center maintains a library, catalog, and literature service; a workshop with drafting tables and equipment is open to architects inspired by displays.

Ten members of the New Jersey Society of Architects, serving on the policy making board, control the quality of products chosen for exhibition. A 2½-year planning and research program preceded the opening of "Built-In Age." During that time, it was determined that an average of 45,000 vehicles pass the location daily. On this basis, 500,000 to 750,000 passers-by are expected to drop in annually. Obviously, this scheme hinges greatly on chance interest and impulse buying.

In conclusion, it becomes increasingly evident that the architectural samples exhibit, begun as a professional service, is now most often a device for attracting consumers, and is a direct link between manufacturer and consumer.

"Built-In Age" Architects Display Building (left) *is located near a major New Jersey highway and is designed to attract motorists.*

George Van Photo

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Indexed in Art Index, Architectural Index.

REINHOLD

why the exams?

Dear Editor: Having recently taken the State Architect exam, I need no reminder that it is rough, but, so what? Is the objective to have a rough exam, or to determine who is fit to serve the public as an architect?

A careful study of the objectives seems in order, rather than research into statistics, which do not prove the merits of the examination.

I feel these three points should form a basis for board action in preparation for an examination:

1. Determine what qualities or abilities make a good architect.
2. Devise the best method to test these abilities.
3. Decide, in the light of the above, what actually is required to protect "health and safety."

The first point of the three seems to me the most difficult; a possible solution might be to test a number of successful architects in order to determine some most obvious talents as requirements for successful service as an architect. The second point, though closely related to the first, should be strongly controlled by the criterion of the third. Eliminating trick questions and only asking things of sufficient import to be remembered, would be a step in the right direction. The field is getting too broad for anyone to attempt to memorize even a part of the Technical standards, which in actual practice would be referred to a handbook.

The fact that the largest number fails in design seems to be the most serious indictment against the examination as now used. "Public Health and Safety," as broad a term as it is, can hardly be stretched to include design. Occasionally an architect has been deprived of his license to practice for certain illegal acts, but it seems to me that bad design would be an impossible basis for such legal action.

A certain amount of experience is obviously an advantage before taking the exam, but without some organized program of continued learning it is useless. Many architects still feel that the best man to hire is one who fits into a niche in his organization and stays there. The employe may or may not garner some bits of worthwhile experience depending upon luck rather than a planned program of development. The remedy for this situation might be a planned study program such as that sponsored by various building trades for apprentices. Require a beginning examination on basics, set up some status for trainees such as "Architect in Training," then continue through the required time with an integrated work study series terminating with a final examination.

Few architects will complain if the examination is too rough; "less competition," they say. The applicant is left in the difficult position of taking it as it comes or risking a single-handed campaign with all the legal cards stacked against him.

If I sound discouraged, I am—it was a rough exam.

ROBERT N. HESSELTINE
Portland, Ore.

fruitful past

Dear Editor: I feel that P/A is very much to be congratulated for giving regular attention (PROGRESSIVE ARCHITECTURE IN AMERICA Series) to those buildings in our past which have been fruitful for the present.

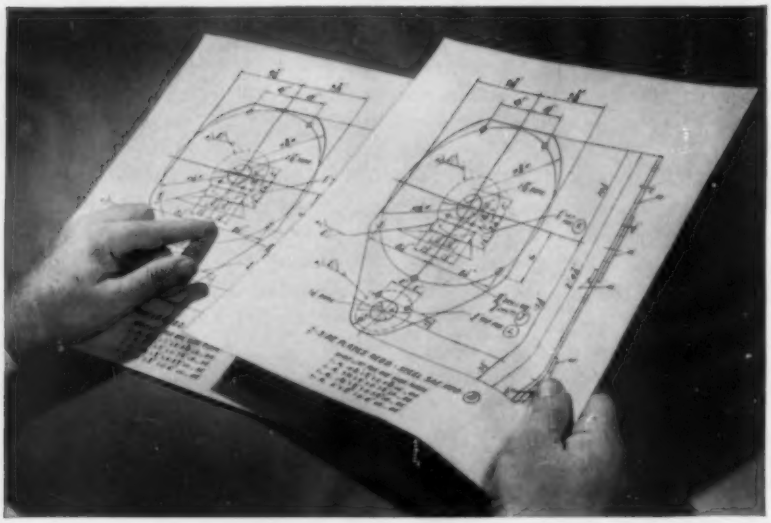
WILLIAM H. JORDY
Brown University
Providence, R. I.

second Gothic?

Dear Editor: Every year it has been a pleasure to read the P/A Design Survey and see the Award-winning works. Every year one can see a new pattern or trend toward something different, something new. That was particularly true for this year. I appreciated very much the intelligent prologue as well as the post-

(Continued on page 14)

DRAFTING TRENDS



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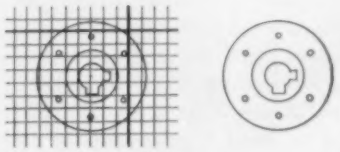

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p/a views

(Continued from page 13)

script (JANUARY 1957 P/A). However, I also would like to add to your fine thought.

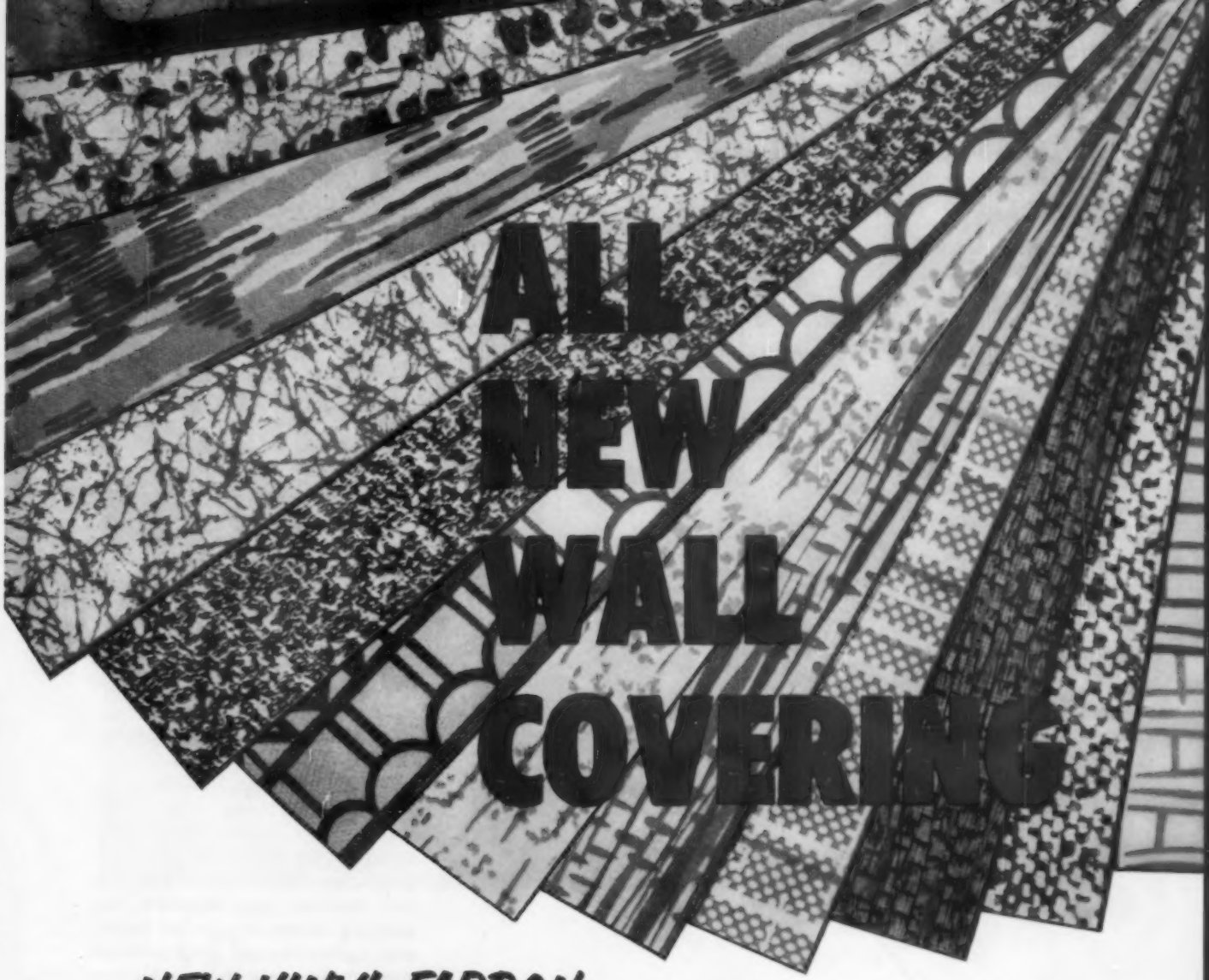
First of all, I think your essay could be more "spiritual" than rational, since everything seems to gravitate toward the spiritual side of things. As a matter of fact, there are no spiritual or rational things, as such. All that there is, is one thing with different faces, as a ray of light split through a glass prism reveals various colors. It is also true, that there are colors of certain wave lengths, which are not visible to the naked eye, and we need supporting instruments. As Vasilij Kandinsky, the pioneer of the abstract arts, expresses it, we have certain mathematical formulas to express certain relationships between certain forces acting upon matter, and we say we know the forces. However, forces and relationships exist which we cannot explain because of the lack of mathematical means. Those are forces which we can only feel, and there may even be forces and relationships upon the universe which we are unable to feel.

I feel that you stress too much the demand-and-supply relationship of the age-old problem—the creative artist and the community. Isn't it true, that the creative artist and the community are one and the same thing?

However, very often, the community doesn't have the least feeling about the future needs and developments of tomorrow's arts. And yet, the same community produces certain individuals, certain artists, who can pick up the ideas somewhere from the universe. They feel the ideas, in many cases not knowing them thoroughly. Yet, strangely enough, the artist expresses such, often even fighting against an entire community: decades pass before the community finally recognizes the new ideas and expressions.

Now and then the artist living,

(Continued on page 16)



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(Continued from page 14)

working, and fighting alone gets lost in some way or perhaps frightened by the new ideas, expressions, and achievements. This is particularly true in times of great changes.

While reading and rereading your essay, to my mind come the great changes from Gothic to Renaissance. As recorded by art historians, this great change involved a change in the perception of space, and, as we all know, central perspective was invented and came into wide use. As a result, all creative art underwent great changes. Many artists, frightened by the new way of art creation, slid back from their achievements—Italian Sculptor Donatello, Italian Painter Botticelli may be cited as well known examples. Botticelli is known even to have destroyed many of his previous works. The same set-back can be found in French and German architecture, where the Gothic style was deeply rooted: we know it as second Gothic.

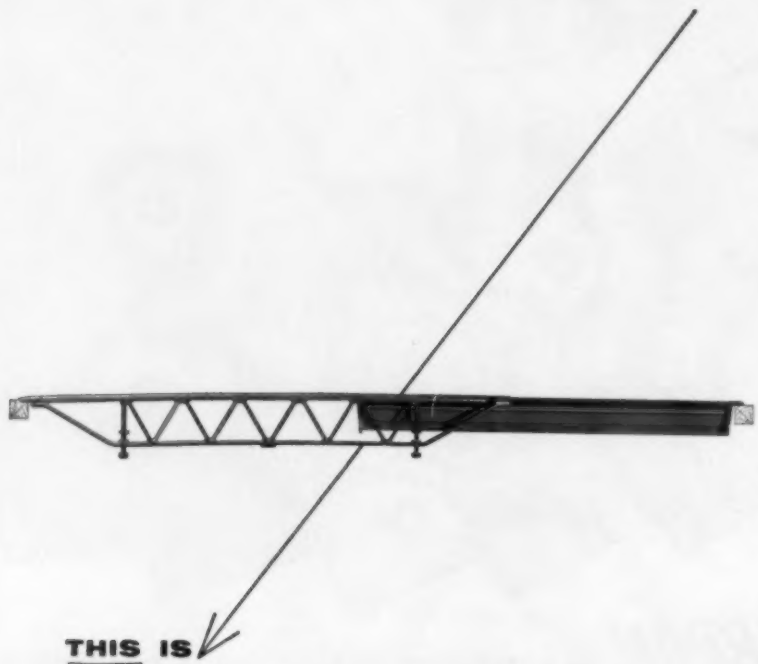
Now I have arrived at the very core of this story. Strangely enough. the new "free form," "spiritual," "vaulted" architecture hides within it the danger of a retrogression to "Style Nouveau." We are in a period of great changes in the perception of space, one as great as the Gothic Man had. We are about to give up the use of central perspective entirely and employ other means to perceive and express space. And that was and still is the basic cause for the great changes in contemporary art. This new trend of architecture of today is likely to gain popularity, because it reminds one of well beloved past "great architecture," contrasting greatly with "mechanical," "machine age," and "international," etc., styles. One can well imagine the throngs of followers of the "Second Jugendstil" or "Style Nouveau."

Many of the conventional style supporters will become staunch supporters of the new trend. To many people, schools will no longer look like factories, nor churches like shopping centers, and the last resistance against contemporary architecture will fade away. Because this new trend is a potential counter-revolution to the revolution of modern art, we might lose many good contemporary architects. Many architects might slip back, frightened finally by the crisp boldness of "yesterday's" architecture — and design "sculptural" buildings like "wedding cakes."

It is also true, that the contemporary architecture will win, becoming simple and balanced, put together from prefabricated parts, as surely as the Renaissance won over the Gothic, 500 years ago.

We hope that kind of architecture will be recognized by all people and in turn bring with it a little better, a little more conscientious men on the community stage.

ARTURS DAMROSE
Ann Arbor, Mich.



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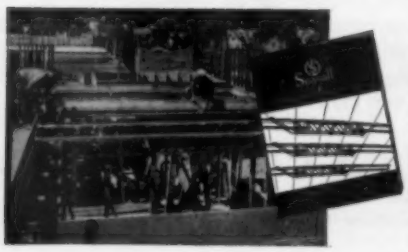

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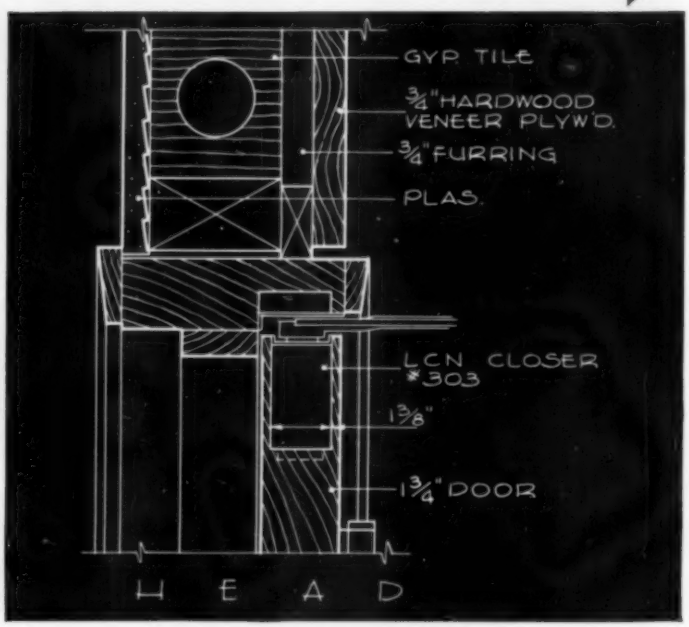
Readers who admired the architecture of Caneel Bay Plantation resort in AUGUST 1957 P/A may be interested to learn that HAROLD G. BASSER and L. W. WINSTON, Structural Engineers, were responsible for the structural engineering design of the central building (*pp. 128-131*)—and Winston also made an initial design for the dock—prior to the collaboration of Praeger-Kavanagh, Structural-Mechanical Engineers, with LaFarge, Knox & Murphy, Architects.



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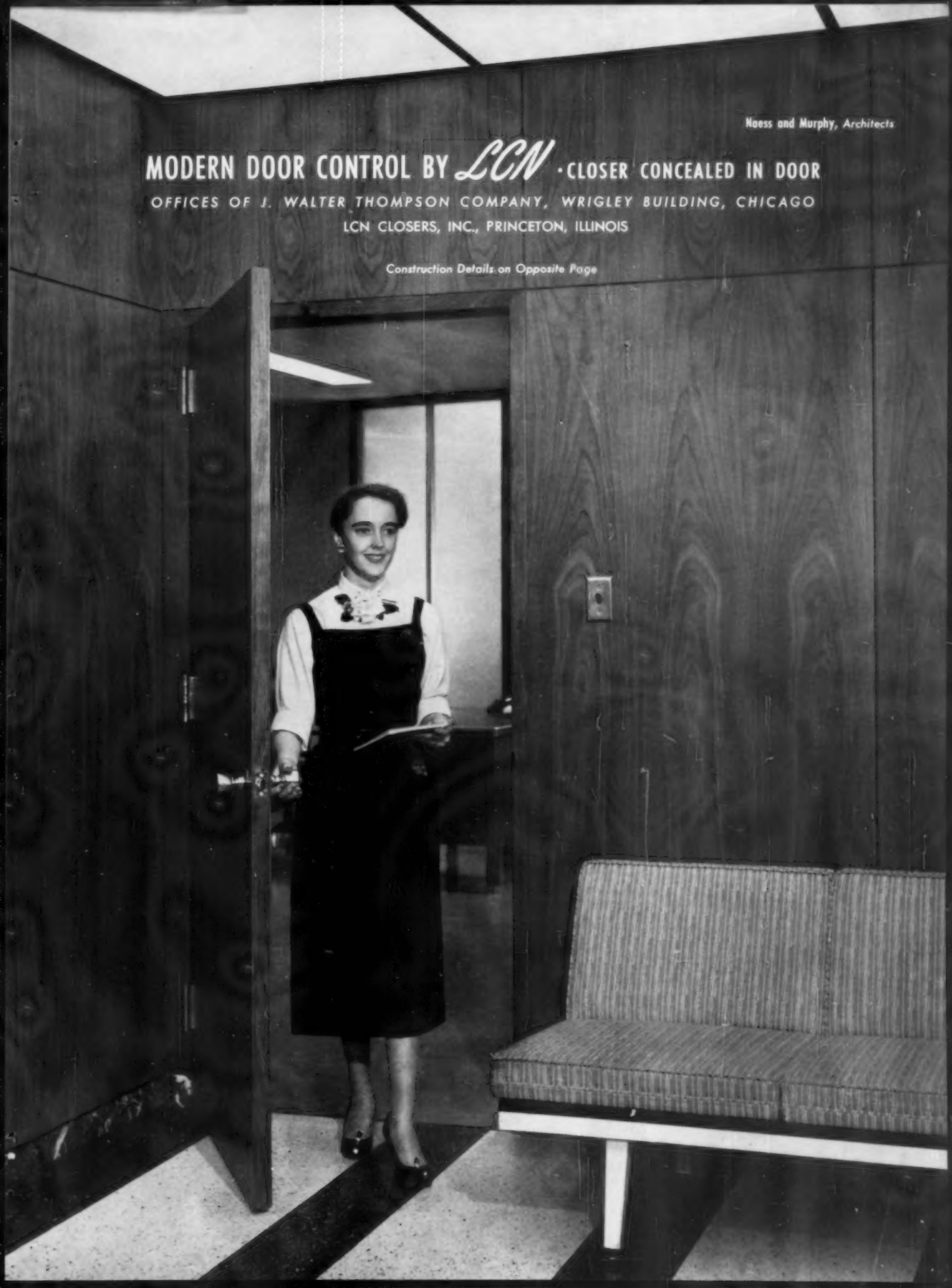

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Plate No. 575

Plate No. 621

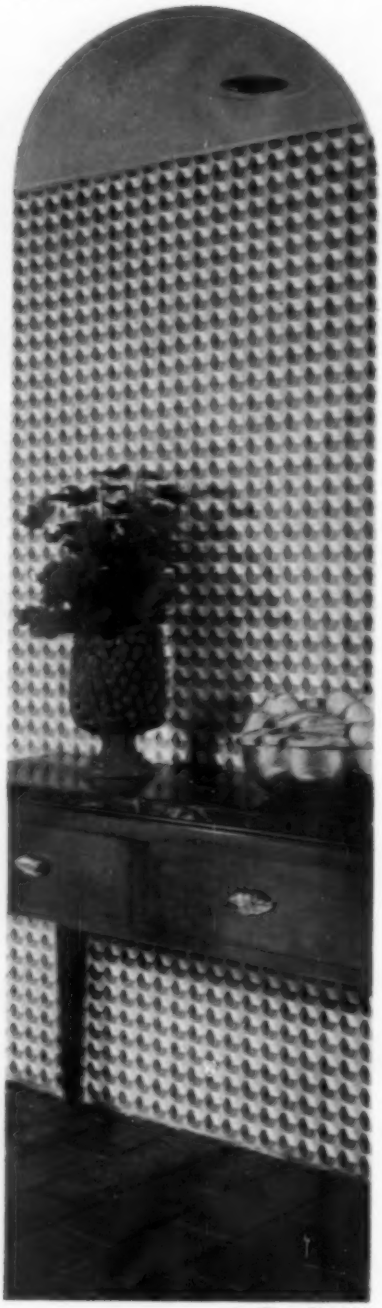

Plate No. 577

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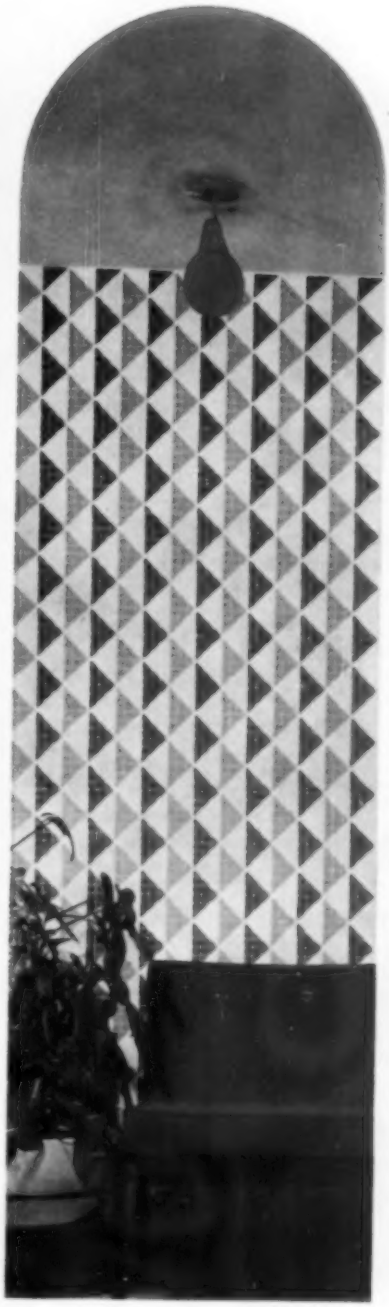
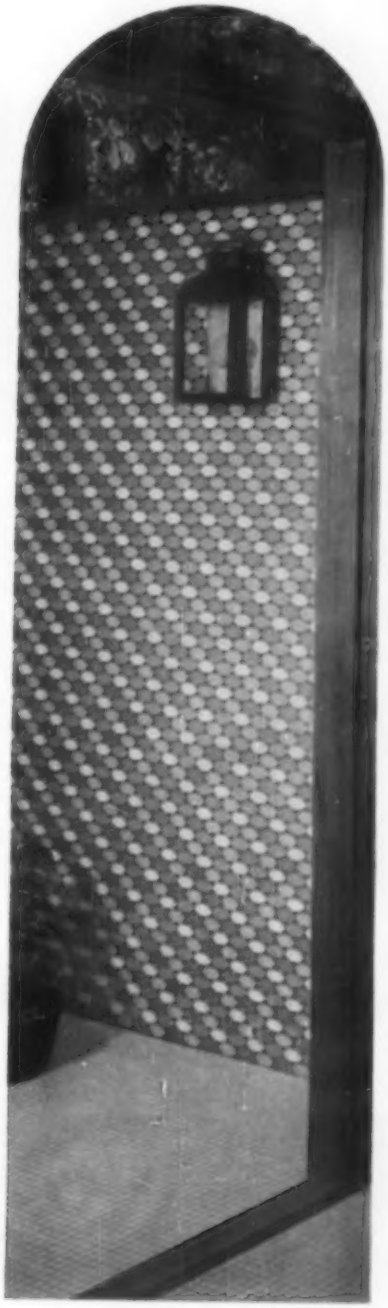


Plate No. 584



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PROOF: Here is a new concept of industrial construction which uses almost unrestricted window area in place of restricting bearing walls, giving its occupants the maximum of natural light and a refreshing view of its suburban surroundings.

Size is 40′ x 88′, and structural framing consists of glulam rigid frames spaced at 16 feet; glulam beams are used to support the second floor. No posts or bearing partitions are required, allowing unlimited flexibility of arrangement. Timbers remain exposed, adding to the pleasant, informal appearance.

Total cost of the building including highest quality mechanical appointments is $13.25 a square foot. For information on the use of engineered timber construction, see our insert in Sweet's Catalog Files, or write us for the booklet, "Buildings for Tomorrow".

TIMBER STRUCTURES, INC.

P. O. BOX 3782-B, PORTLAND 8, OREGON

Offices in Ramsey, N. J.; New York City; Boston; Philadelphia; West Hartford; Cleveland; Charlotte; Chicago; Centerline, Mich.; Kansas City; Kirkwood, Mo.; Minneapolis; Des Moines; Wichita; Memphis; Dallas; Houston; Birmingham; Seattle; Spokane; Denver.

Local Representatives throughout the United States and Canada

TIMBER STRUCTURES, INC. OF CALIFORNIA
• RICHMOND
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see our catalog in Sweet's or write for copy

Office and factory building of Thomas A. Shutz Company, Morton Grove, Illinois, with framing of glulam rigid frames spaced at 16′. Architect: Seymour S. Goldstein, Chicago; Stromberg Construction Company of Chicago was general contractor.

LOWER LIGHTING COSTS

with fluorescent fixtures using

CERTIFIED CBM BALLASTS

UP TO 2500 HOURS MORE LAMP LIFE in fixtures using Certified CBM Ballasts. And rated light output, too. That's what tests by fluorescent lamp makers show.

TROUBLE-FREE SERVICE . . . for Certified CBM Ballasts provide assured ballast life . . . quiet operation . . . minimize replacements and repairs.

MADE TO EXACTING SPECIFICATIONS for performance by 8 leading ballast manufacturers, CBM Ballasts are checked and certified by ETL. And they're UL listed, also.

NO POWER FACTOR PENALTY on lighting bills because Certified CBM Ballasts are High Power Factor. (Saves on installation costs, too!)

Eight leading manufacturers now make up

CERTIFIED BALLAST MANUFACTURERS

2116 KEITH BUILDING • CLEVELAND 15, OHIO

Participation in CBM is open to any manufacturer who wishes to qualify

CBM-8-OU

For Grand Rapids Christian High School's Memorial Gymnasium,

the finest structural materials

FROM TOP

T-Chord Longspan Joists were chosen to support the roof because of their rigid clearspan strength which made possible the 125′ wide column-free area. By providing maximum clearspan strength with minimum weight, Haven-Busch T-Chord Longspan Joists substantially reduced the number of supporting columns, eliminated purlins and subjoists while offering a neat, uniform appearance and adding to the economy and ease of installation.

Christian High School Memorial Gymnasium, Grand Rapids, Michigan
Architect: James K. Haveman, Grand Rapids, Michigan
General Contractor: William DeVries, Grand Rapids, Michigan

TO BOTTOM

Robbins Northern Rock Maple narrow-face Strip Flooring was selected for the basketball floor for its resiliency, smoothness, durability, plus warm, natural beauty and lifetime economy. Robbins Ironbound* Continuous Strip* pattern Northern Maple Flooring was selected for the balcony practice and shuffleboard area because, while having all the advantages of hard maple, it is laid in mastic directly on concrete, eliminating the necessity of a built-up floor.

Perhaps Robbins flooring and Haven-Busch steelwork can contribute their important benefits to *your* next job. For information on either product, write the respective company.

*T.M. Reg. U. S. Pat. Off.

HAVEN-BUSCH *Company*

Grandville, Michigan

Designers, fabricators and erectors of structural steel, joists and miscellaneous iron

ROBBINS *flooring company*

World's Largest Manufacturer of Maple Flooring

Reed City and Ishpeming, Michigan

Performance
best proof

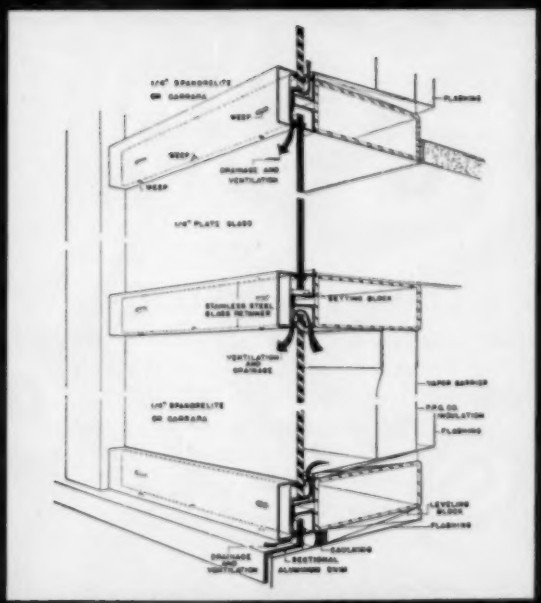
82-x framing
for *Glass-clad* buildings

in the field_ we can offer

Proof of what? Simply this. Numerous methods are employed in selling a product like No. 82-X. For example, the use of models is a common and effective medium. The results of accelerated tests have their value, while the efforts of a trained salesman are responsible more often than not for having a product detailed and specified. But when you can point to actual installations that have performed satisfactorily for a long period of time, it is undeniably the very best proof of performance that can be offered.

You are invited to visit these installations. Inspect them. Talk to the owners. Find out firsthand how No. 82-X framing, in combination with other PPG products, has functioned as a weather-tight wall of glass and metal.

No. 82-X framing is not large dimension-wise, but it is firm and strong. It provides a full resilient grip on the glass without the use of compounds. Ventilation and drainage are accomplished through a system of carefully positioned holes. It is clean, well balanced and unobstructive in design. No. 82-X was developed in the interest of economy for long service, with a minimum of maintenance.



The perspective above shows a typical cross section through No. 82-X, illustrating its many outstanding features. No. 82-X is available in ALUMINUM, BRONZE AND STAINLESS STEEL, all beautifully finished. The partial list of Pittsburgh Glass Clad Buildings at right is the best endorsement of our construction we can offer.

COMPLETED INSTALLATIONS

National Carbon Research Laboratory
Parma, Ohio
Architect: Skidmore, Owings & Merrill
New York, N. Y.

Education Building for First Baptist Church
Magnolia, Ark.
Architect: Ginocchio, Cromwell & Associates
Little Rock, Ark.

Union Federal Savings & Loan Building
Baton Rouge, La.
Architect: A. Hays Town
Baton Rouge, La.

Colonial Provision Company
Boston, Mass.
Architect: Henschein, Everds & Crombie
Chicago, Ill.

Avon Products Building
Morton Grove, Ill.
Architect: Skidmore, Owings & Merrill
New York, N. Y.

Freeport Dial Office Building
Freeport, Ill.
Architect: Holabird, Root & Burgee
Chicago, Ill.

Motorola Electronics Facility Building
Phoenix, Ariz.
Architect: Edward L. Varney, Associates
Phoenix, Ariz.

D. J. Kaufman, Inc.
Washington, D. C.
Architect: David Baker
Washington, D. C.

North Side Junior High School
Omaha, Nebr.
Leo A. Daly, Architect, Omaha, Nebr.

UNDER CONSTRUCTION

Louisiana State Library
Baton Rouge, La.
Architect: Burk & Desmond
New Orleans, La.

Youngstown Sheet & Tube Co.
Youngstown, Ohio
Garfield, Harris, Robinson & Schafer, Architects,
Cleveland, Ohio

Homestead Hospital
Homestead, Pa.
Press C. and William E. Dowler, Architects,
Pittsburgh, Pa.

Newton D. Baker Memorial Building
Western Reserve University, Cleveland, Ohio
Garfield, Harris, Schafer,
Flynn & Williams, Architects, Cleveland, Ohio

Farm Bureau Insurance Co.
Concord, N. H.
Alonzo J. Harriman, Inc., Architect,
Auburn, Maine

Glenn L. Martin Building
Orlando, Fla.
Architect: Connell, Pierce,
Garland & Friedman & Associates
Miami, Fla.

Continental Can Company
Three Rivers, Mich.
Architect: Schmidt, Garden & Erikson
Chicago, Ill.

Boston University Public Relations
Boston, Mass.
Architect: Richmond & Goldberg
Boston, Mass.

Chevrolet Motor Division
Zone Office and Parts Division
Jacksonville, Fla.
Argonaut Realty Division, Architects, Detroit, Mich.

Hartford County Mutual Fire Insurance Co.
Hartford, Conn.
Sherwood, Mills & Smith, Architects,
Stamford, Conn.

Gibraltar Savings & Loan Building
Houston, Texas
Grecian & Brogniez, Architects,
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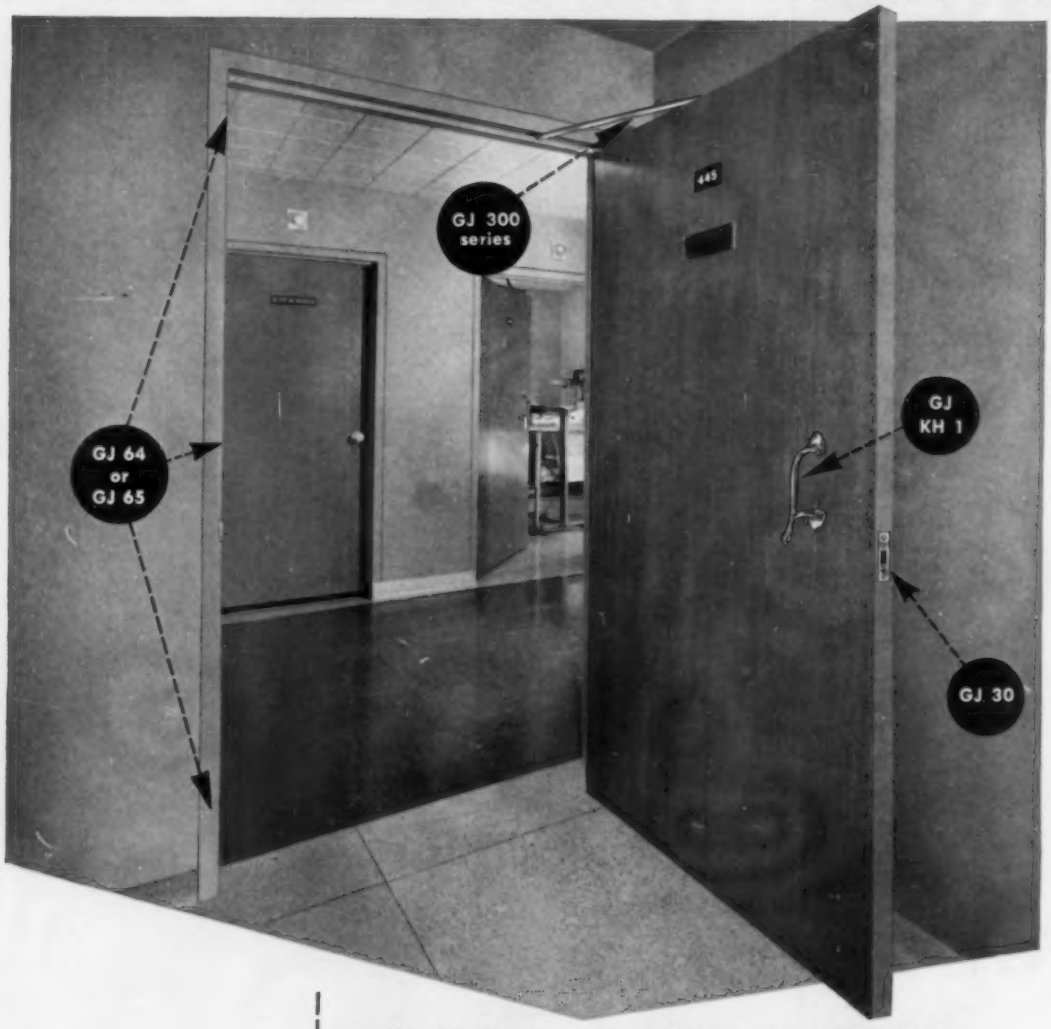
an ideal specification for silent, efficient
PATIENT ROOM DOOR CONTROL



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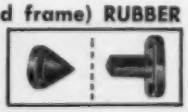
GJ 300 series CONCEALED (or surface mounted) OVERHEAD FRICTION TYPE DOOR HOLDER." (Nurse may set door at any desired degree of opening for ventilation or privacy. Door cannot slam open or shut.)

"GJ KH 1 COMBINATION HAND AND ARM PULLS to be mounted back to back as a pair." (Convenient for opening door from either side with sterile hands or when carrying loaded trays.)

"GJ 30 ROLLER LATCH." (Eliminates disturbing latch "clicking" sound. Replaceable rubber roller *silently* engages dirt-free strike. Latching pressure adjustable.)

"THREE GJ 64 for metal frame (or GJ 65 for wood frame) RUBBER SILENCERS." (Form pneumatic air pockets to absorb shock or noise of closing and create constant latch tension . . . no door rattling.)



This ideal specification for patient room doors is used in such outstanding hospitals as:

Kaiser Foundation Hospital, Los Angeles, Calif. Wolff & Phillips, Portland, Oregon — architects

Oak Park Hospital, Oak Park, Illinois Shaw, Metz and Dolio, Chicago — architects

Providence Hospital, Washington, D.C. Faulkner, Kingsbury & Stenhouse, Washington, D.C. — architects

Rhode Island Hospital, Providence, R. I. Shepley Bulfinch Richardson & Abbott, Boston, Mass. — architects

All above hardware can be quickly installed on existing patient room doors.

write for HOSPITAL DOOR CONTROL brochure E-4

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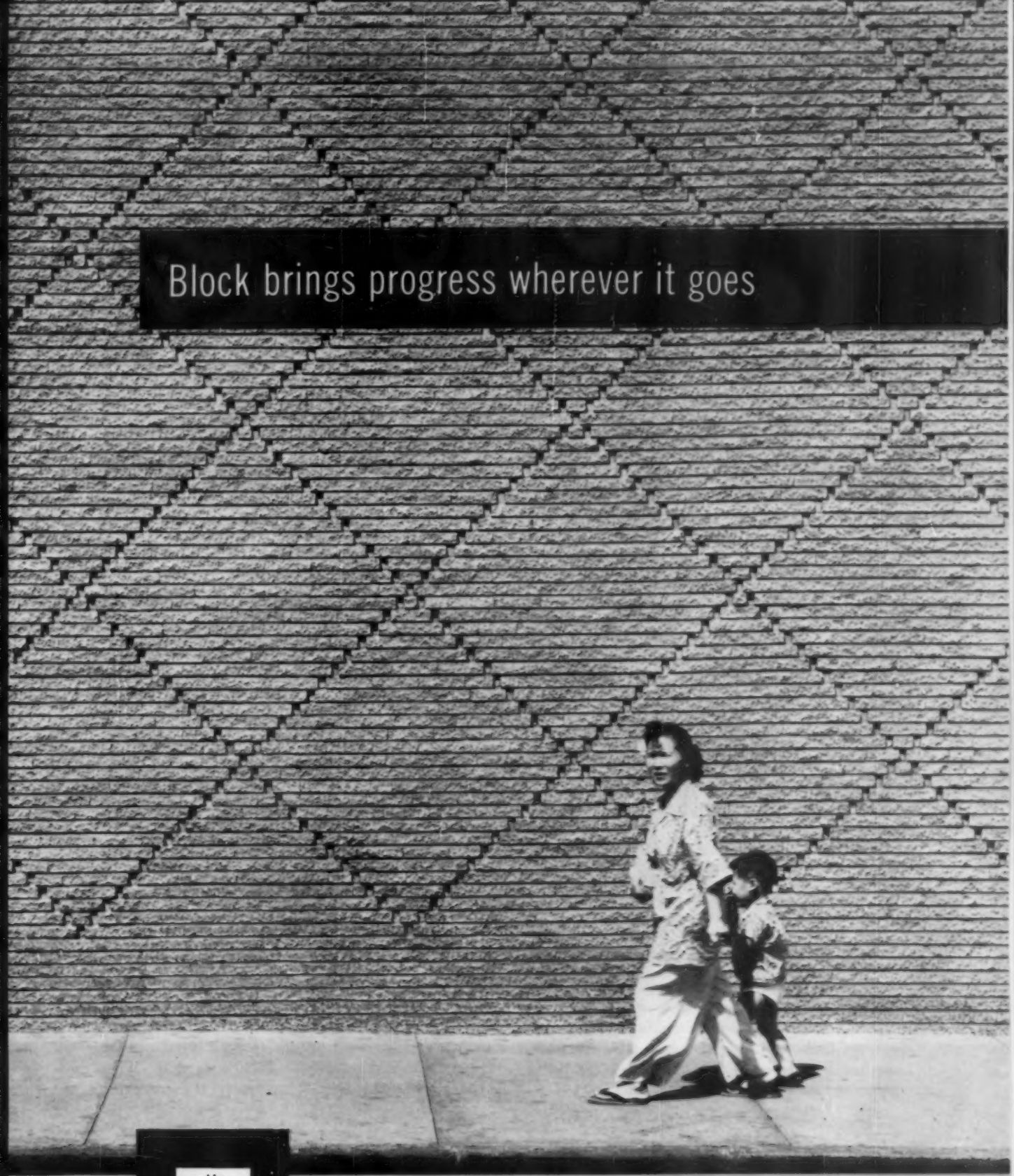

Split block used in the Liberty Bank Building, Honolulu, Hawaii. Vladimir Ossipoff, Architect.
Ask your local NCMA member for a copy of the new booklet "Split Block Architecture."

National Concrete Masonry Association · 38 South Dearborn Street · Chicago

BRIGGS BEAUTYWARE announces

featuring the SCULPTURED LOOK . . .

B6782—SULTAN: Syphon jet wall hung bowl with top spud.

B4012—MERCURY drinking fountain with glass filler. Semi-recessed, wall hung.

B3461—MILTON: 24" x 20" lavatory with back, 8" centers. For concealed carrier.

B6960—SANITON: Syphon jet women's urinal with floor outlet, top spud.

B6706—CARLTON: Syphon jet floor outlet bowl with top spud.

B6911—LAWTON: Wall hung washout urinal with extended shields, top spud.

A complete new line of vitreous china fixtures for commercial, industrial and school use!

Briggs Beautyware—famous for quality plumbing fixtures for residential use—now moves into the industrial, commercial and school field with a complete new line of vitreous china plumbing fixtures. Designed by Harley Earl, Inc., they feature a *sculptured look* that's as contemporary as today's architecture! And, there's a size and type of fixture to meet nearly every commercial and industrial requirement—from lavatories to service sinks, from men's and women's urinals to drinking fountains. Shown above are representative models. Write today for complete specifications on the entire line.

BRIGGS

two new plumbingware advances

a dynamic new design concept

T-8116. Combination bath and shower fitting with automatic diverter valve in spout. 8″ centers, self-cleaning shower head, shower arm with ball joint and flange.

T-8106. Combination bath and shower fitting with manual diverter, 8″ centers, self-cleaning shower head; shower arm, ball joint, flange.

T-8722. Combination 4″ centerset lavatory fitting with spray spout and strainer waste.

T-8710-S-8. Combination lavatory fitting, 8″ centers, with aerator, pop-up drain, 1¼″ tailpiece. Also available for 10″ and 12″ centers.

T-8401. Trip lever drain with 1½″ tailpiece. (overflow plate and drain plate illustrated).

A colorful new line of Beautyware Brass fittings for both residential and commercial use!

Briggs incorporates the "sculptured look" into its new Beautyware line of brass fittings in truly exciting fashion! This advanced styling by Harley Earl, Inc., is the perfect compliment to Briggs residential and commercial lines. In addition, new Beautyware brass fittings incorporate unique, interchangeable colored inserts to match each Briggs color as well as chrome and white. Write now to Briggs for a colorful brochure with complete details and specifications.

BRIGGS MANUFACTURING COMPANY · WARREN, MICHIGAN

B E A U T Y W A R E

Armstrong Custom Minaboard is a strong, rigid lay-in unit for installation in exposed grid systems.

New Armstrong Custom Minaboard

NOW you can specify an acoustical ceiling board for exposed grid systems that not only offers all the benefits of this type of board, *but stays clean!*

"Breathing," a frequent problem with lower density boards of this type, has been completely eliminated in new Armstrong Custom Minaboard. Unlike lighter materials that do not resist air infiltration, Armstrong Custom Minaboard retards the movement of air through the board. This minimizes the maintenance problem by preventing build-up of dust and dirt on the surface of the board.

The density and mineral-fiber composition of Armstrong Custom Minaboard also provide an excellent sound transmission resistance factor (26 db at 4,000 frequency).

This is extremely important in construction utilizing ceiling-height movable partitions.

Armstrong Custom Minaboard is completely fire safe and will not support combustion. It has a Class "A" rating under federal specifications. The mineral fiber used in the board is blended with special toughening agents to produce a rigid panel with exceptionally high strength.

The washable white surface of Custom Minaboard has an exclusive pattern of small perforations that creates an attractive over-all ceiling design.

PHYSICAL CHARACTERISTICS:

Size: 23-3/4" x 47-3/4"

Thickness: Nominal 5/8"

Density: Approx. 19 lbs/cu. ft.

Surface: Sanded face finish with white washable Latex paint

Flame Resistance: Class A (Fed. Spec. SS-A-118b)

Light-Reflection Coefficient: "a" (.81)

SOUND-ABSORPTION COEFFICIENTS:

Mounting	125 Cycles	250 Cycles	500 Cycles	1000 Cycles
(7) mechanically supported	.32	.52	.80	.92

2000 Cycles	4000 Cycles	N. R. C. Specification Range
.71	.47	.70 - .80

eliminates "breathing," stays clean

Custom Minaboard presents no maintenance problems. It can be cleaned with a vacuum cleaner or damp cloth. It can be repainted by conventional methods when necessary without appreciable loss of acoustical efficiency.

Your Armstrong Acoustical Contractor can give you complete data and specifications on this newest addition to the extensive line of Armstrong Acoustical Materials. For a free booklet on Custom Minaboard, write to Armstrong Cork Company, 4211 Watson Street, Lancaster, Pennsylvania.

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Custom Minaboard*

*TRADE-MARK

Why Longspans Were Used in Building These Stores

These two stores—a supermarket in Philadelphia and a clothing store in a Buffalo, N. Y., shopping center—have roof structures containing Bethlehem Longspan Steel Joists.

Bethlehem Longspans were used for several good reasons. First, they gave maximum floor area below, with supporting columns reduced to the smallest number possible. This allowed freedom in the arrangement of counters and merchandise displays, while giving the stores maximum aisle space.

Longspan joists saved construction time, too, for they reached the job completely fabricated, ready for immediate placing. And in masonry construction, they reduce the need for pilasters which often interfere with wall design. Installation of recessed lighting fixtures and of wiring and air-conditioning ductwork was simplified by using Longspans, for pipes and wires were run right through the open webs.

Bethlehem Longspans will also reduce future maintenance in these two buildings because they provide a non-warping, non-sagging construction. And in combination with concrete floor slabs and plaster ceilings, they give a fire-resistance of up to four hours, depending upon the thickness of the slab and the type of plaster used.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM LONGSPAN STEEL JOISTS

BETHLEHEM STEEL

For walls that go with any decor

SIMPSON TOASTED "V" GROOVE REDWOOD PLYWOOD

When you have a client who says, "I want a room that goes with the furniture we already have," you'll be wise to recommend Simpson Toasted "V" Groove *redwood* plywood paneling. This versatile wood goes with any decorating scheme.

It consists of clear, all heart rift grain redwood plywood, with a rich sheen to it, and with deep grooves literally "toasted" in every 5, 11, 7, 9, 10 and 6 inches for a relaxed, friendly random-planked effect.

This distinguished paneling by Simpson offers architects rare opportunities for warm yet dramatic effects in new homes, offices and public buildings. It is also ideal for remodeling, since it can be put up right over old wall surfaces.

So if you want to give your client's project inherently warm and welcoming overtones, specify interiors of Simpson Toasted "V" Groove redwood plywood paneling. Simpson Toasted "V" Groove plywood paneling is also available in fir, Philippine mahogany and knotty pine.

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Plywood & Doors, Room 902-B
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FREE Toasted "V" Groove Redwood sample together with Simpson's new 36-page booklet, "Manual on Finishing Plywood," which has 68 full-color finish illustrations plus decorating ideas and suggestions for the use of plywood in the home.

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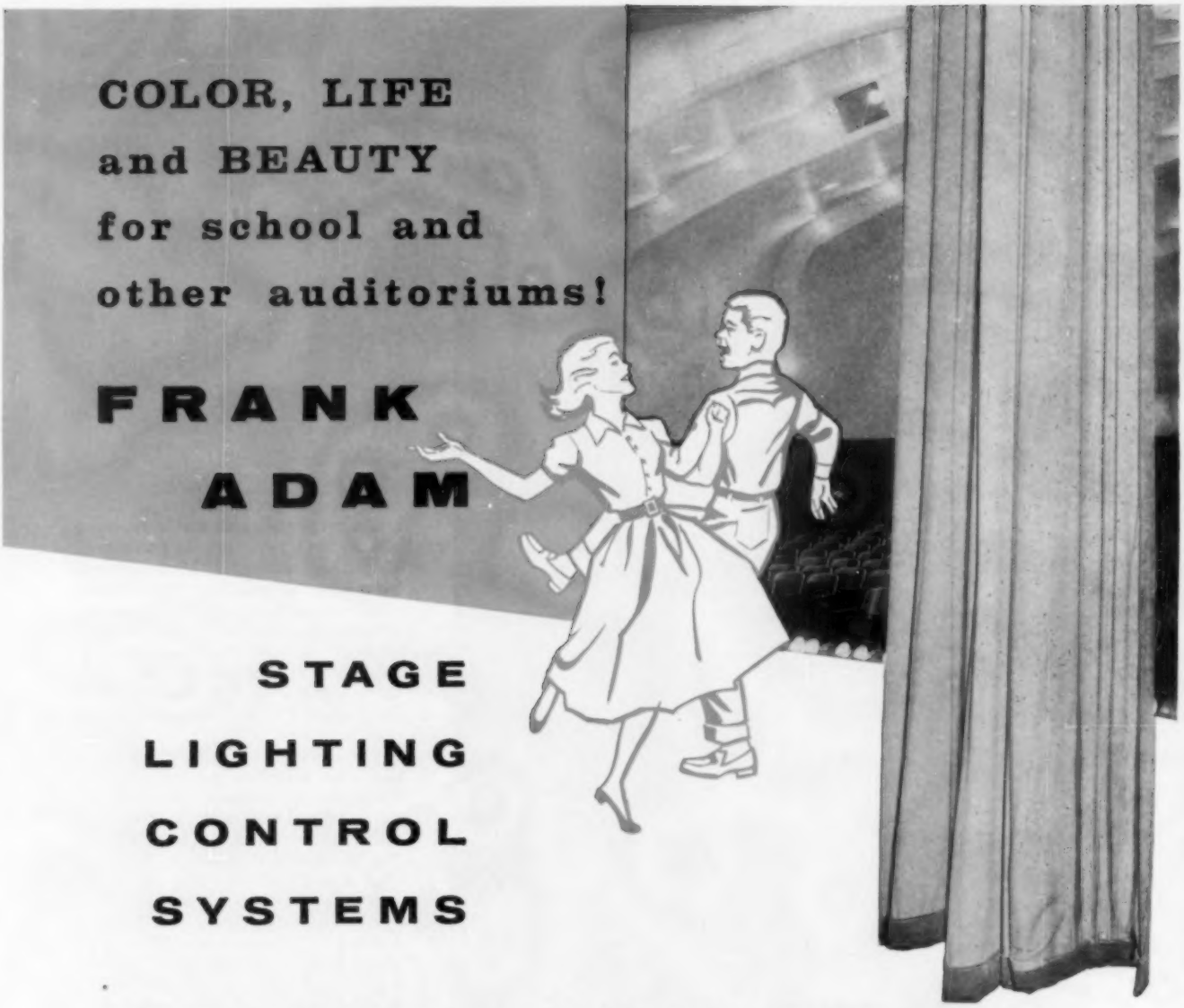
COLOR, LIFE and BEAUTY for school and other auditoriums!

FRANK ADAM

STAGE LIGHTING CONTROL SYSTEMS



Add to the color, beauty, usefullness and enjoyment of all school, college and other auditoriums you design by including Frank Adam Stage Lighting Control Systems in your plans and specifications.

The result of more than 50 years experience and technical "know how" Frank Adam Stage Lighting Control Systems embody all the latest features in design and construction—factors that have made Frank Adam Controls a popular choice of architects and engineers for School, College and other types of auditoriums—both large and small.

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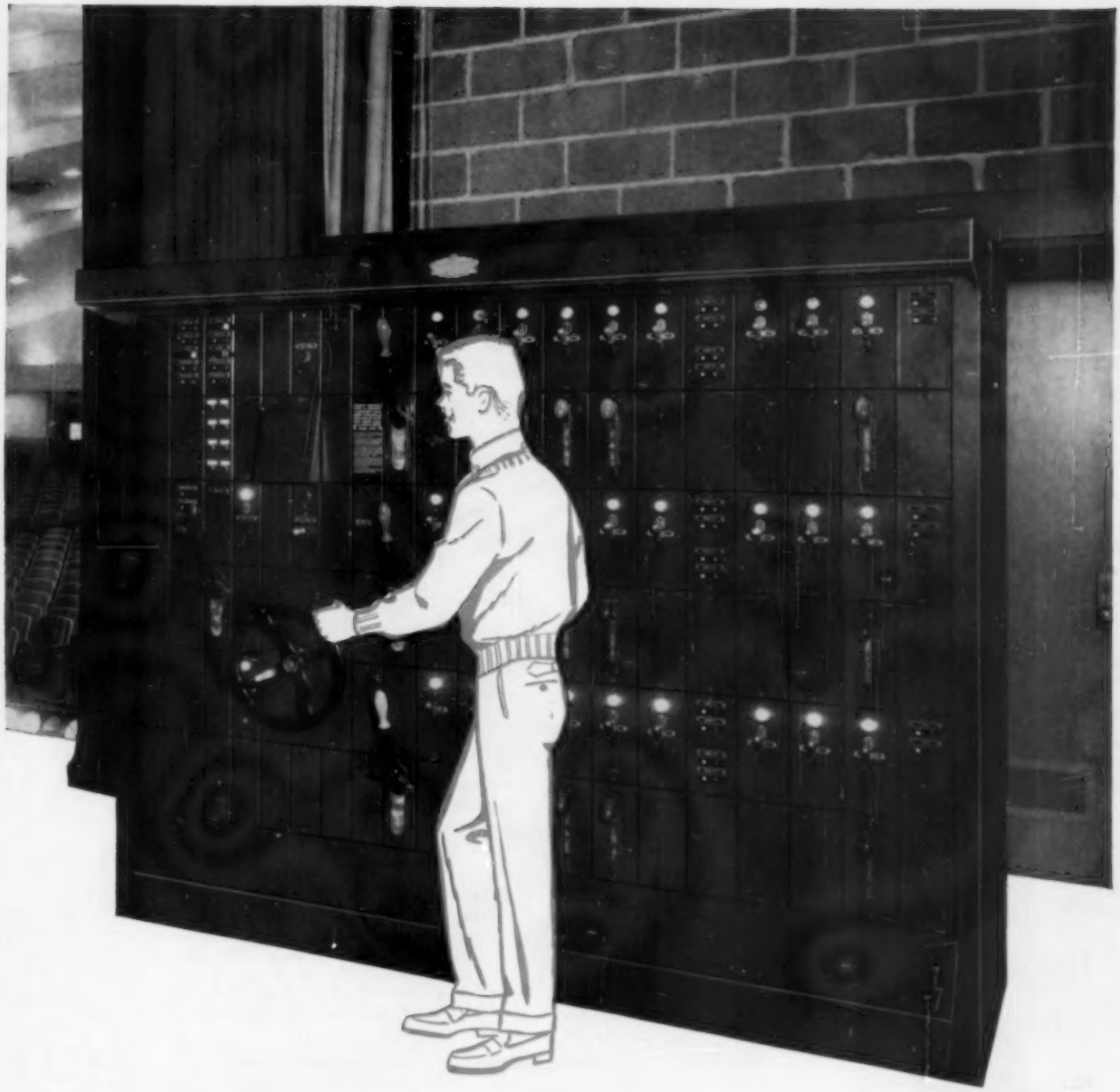
Frank Adam Controls are built on the unit basis and can be made to fit any type or size of auditorium. All bear the seal of approval of the Underwriters' Laboratories' Inc., and will give long-lasting and trouble-free service.

For further information about Frank Adam Stage Lighting Control Systems and other products, contact your nearest Frank Adam representative, listed in Sweets or write for Bulletin No. 801.



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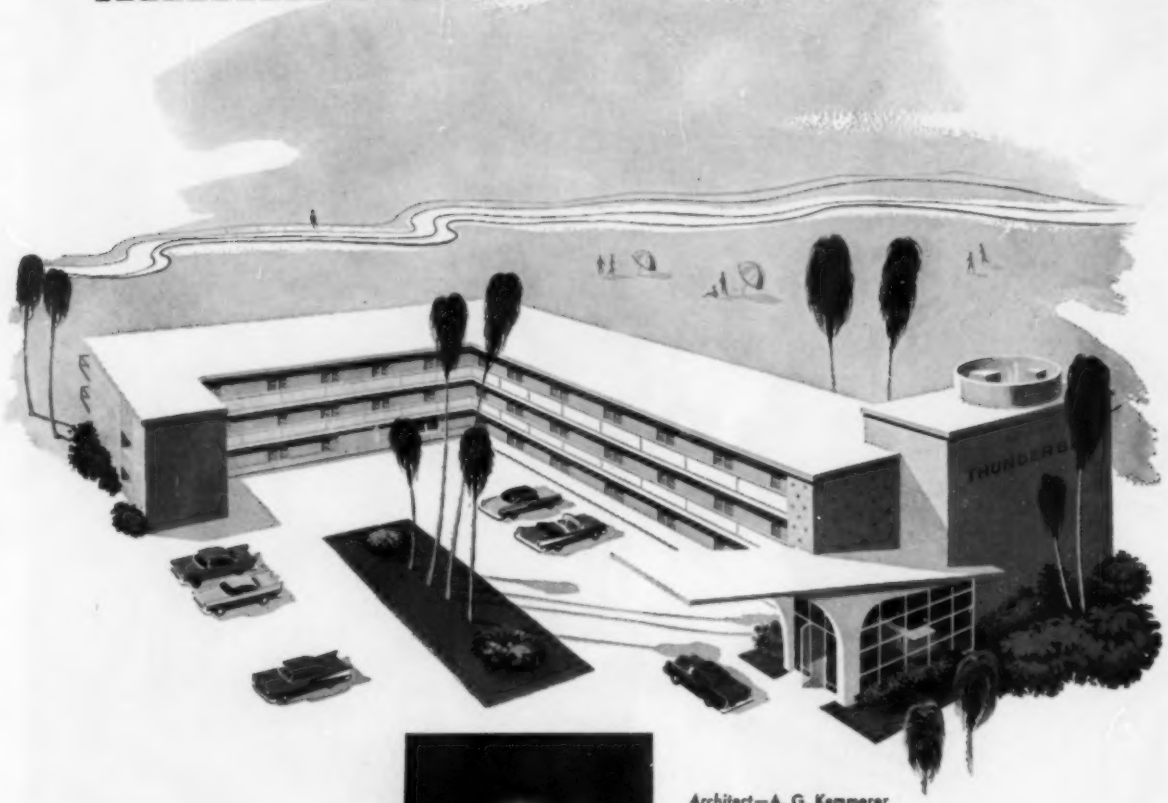
ANOTHER PRESTRESSED CONCRETE STRUCTURE



Architect—A. G. Kemmerer
Contractor—Don Avery
Prestressed units were fabricated and erected by Perma-Stress, Inc., Holly Hill, Florida.

Mr. Kemmerer is an architect in Daytona Beach, Florida, and is the designer of the Thunderbird Motel in the same city. This structure is believed to be the largest motel in the world using precast, prestressed concrete slabs for the roof and floor system; 100 units with an approximate floor area of 25,000 sq. ft. and a roof area of 17,000 sq. ft.

Alfred Kemmerer gives his reasons for using prestressed concrete in this motel

Consult Roebling... *First* in U.S. with prestressing and tensioning elements

Getting back to Mr. Kemmerer and his reasons, he says:

"I have found prestressed concrete to be the most practical, *inexpensive* structural material for use in a *fire-resistant* building." He continues, "It enabled us to complete construction of this project *thirty days ahead of its scheduled completion date* and its own composition makes it *exceptionally durable in the face of the strong, corrosive salt winds* from the ocean." In closing, Mr. Kemmerer says, "The *maintenance* of exposed prestressed concrete *is negligible* in comparison with similar products in its field."

The only liberty we have taken with Mr. Kemmerer's statement is to italicize those segments that might appeal to you. For, by itself, each is significant enough to warrant your attention. Collectively, they are some of the reasons why this remarkable construction method is growing in design acceptance the country over in virtually every kind of structure.

Should any of Mr. Kemmerer's reasons excite your interest (or if you're desirous of knowing more about precast, prestressed concrete per se), you have only to write to Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey, for any or all details. And we have plenty of information.

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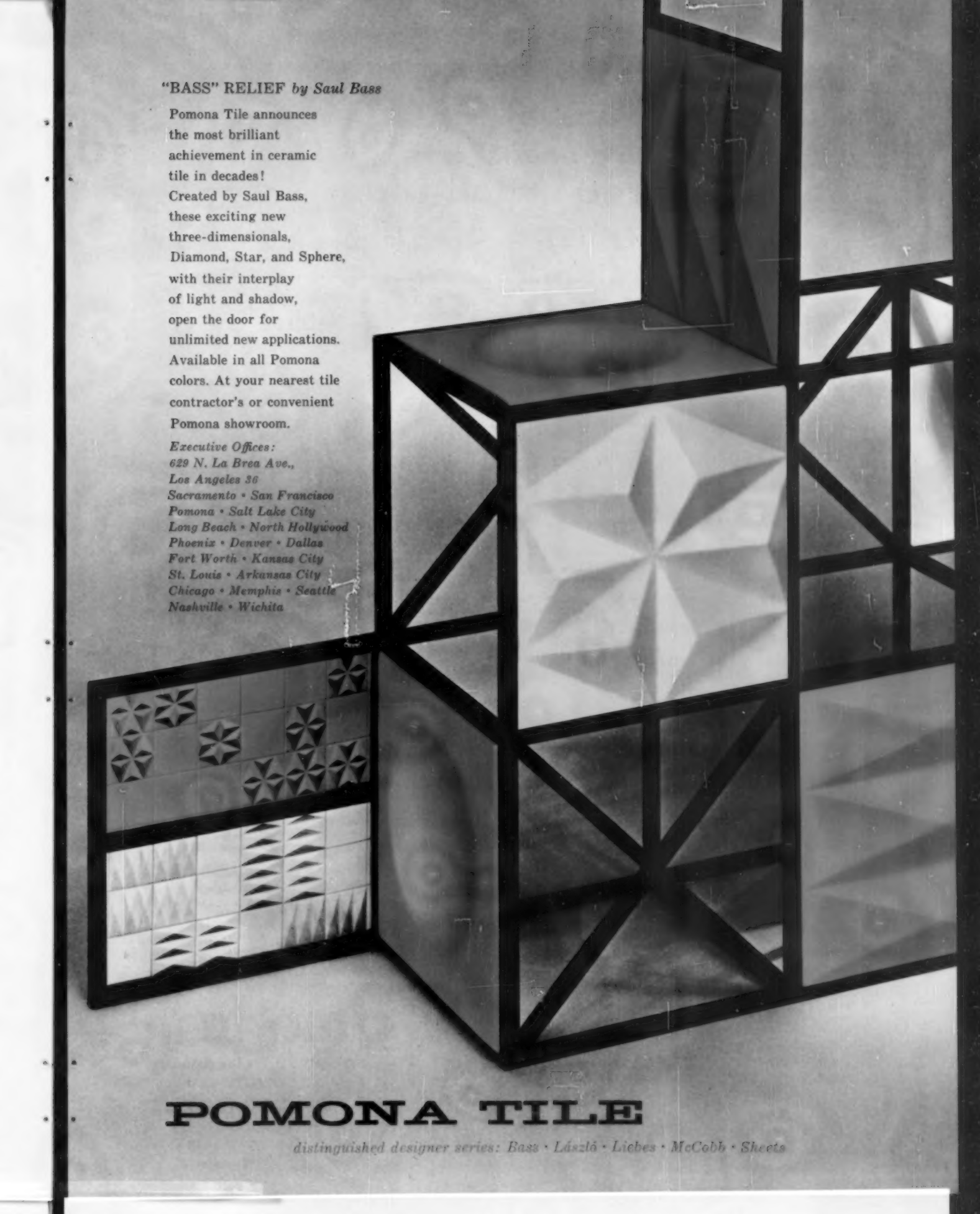
Subsidiary of The Colorado Fuel and Iron Corporation



"BASS" RELIEF *by Saul Bass*

Pomona Tile announces the most brilliant achievement in ceramic tile in decades! Created by Saul Bass, these exciting new three-dimensionals, Diamond, Star, and Sphere, with their interplay of light and shadow, open the door for unlimited new applications. Available in all Pomona colors. At your nearest tile contractor's or convenient Pomona showroom.

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glare reducing sheet glass is being glazed nation-wide in every type of installation

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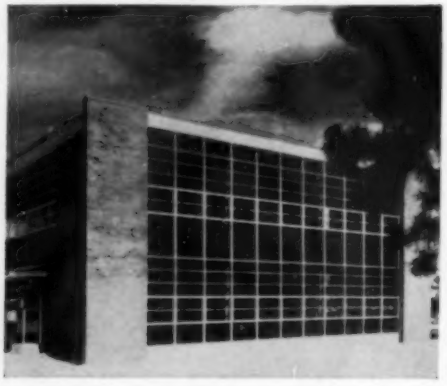
Aluminum Structures, Inc., Pittsburgh, Pa. Architects: Schell, Deeter & Stott

St. Paul Lutheran Church, Naugatuck, Conn. Architects: Peterson & Tilney

St. Petersburg Junior College, St. Petersburg, Fla. Architects: C. Dale Dykema & Assoc.



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Paramus, N. J.
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HOMES
Los Angeles, Calif.
Colorado Springs, Colo.
Ft. Lauderdale, Fla.
Green Harbor, Mass.
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Seattle, Wash.

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Marietta, Ga.

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Indianapolis, Ind.
Detroit, Mich.
Manchester, N. H.
Oklahoma City, Okla.
El Paso, Texas

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Pittsburgh, Pa.
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WOW 6898

Here's why Lustragray is the most functional glass for glazing:

- **Permits large glass areas without discomfort of sun glare**
- **Reduces heat transmission**
- **Provides exterior skin wall effect with interior "clear glass" vision**
- **Neutral shade eliminates color problems**

This non-fading and color constant sheet glass is the most economical gray glass on the market and is available in thicknesses of 3/16", 7/32" and 1/4". For literature write our Architectural Promotion Department.

MODERN GLASS *Best at a Glance*

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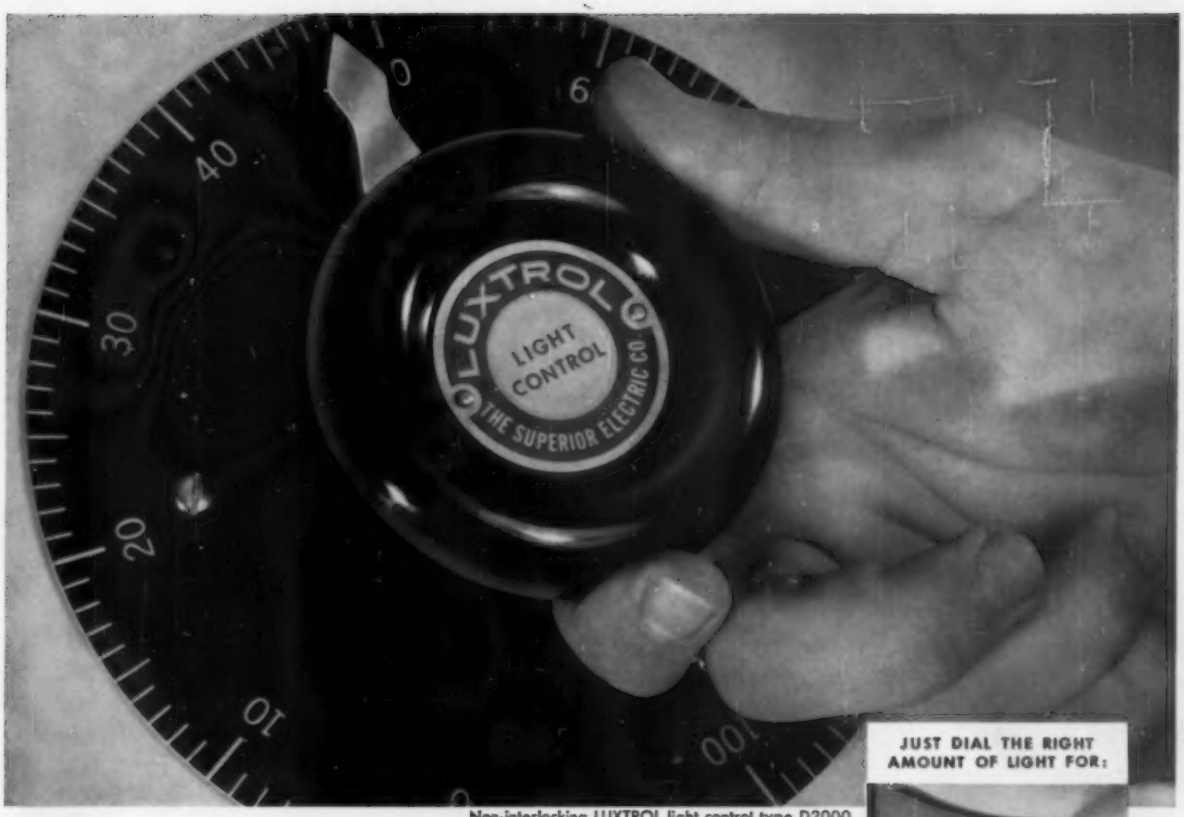

Non-interlocking LUXTROL light control type D2000

with the twist of a wrist

any level of light

All-level lighting with its infinite gradations of light intensity provides a low cost but effective method of creating moods — moods that bring your clients pleasure or profit.

Turn the LUXTROL light control clockwise and the area brightens. People make decisions faster, hurry and make way for others. Turn counterclockwise and the lights dim. The mood changes. Customers linger longer and spend more than they planned.

You will find light control a multi-purpose tool to create the right effect at the right time in any area where people gather.

LUXTROL light control equipment can be used on incandescent, fluorescent and cold cathode lamps. In the complete line are units to meet all requirements from 360 to 30,000 watt loads. Send the coupon below for full information.

JUST DIAL THE RIGHT AMOUNT OF LIGHT FOR:

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Lifetime perimeter

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Wolfe & Gilchrist choose STYROFOAM for finest perimeter insulation

Keith Gilchrist, builder of contemporary homes, reports, "I've found Styrofoam the best ever for perimeter insulation in basementless homes. The way it protects against cold, heat and dampness is really something."

(All photos shown here were taken in Wolfe & Gilchrist's Holly Hill subdivision, northwest of Detroit, Michigan.)

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insulation with Styrofoam

2 Apply vapor barrier . . .

3 Pour concrete floor slab . . .

STYROFOAM* (a Dow plastic foam) is a new kind of homogeneous insulation introduced by Dow, First in Foam. It resists rot, mold and deterioration. It has no food value—does not attract rodents and vermin.

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For further information, contact your nearest Styrofoam distributor: CALIFORNIA, San Francisco: Western Foam Products, Inc. • CALIFORNIA, Los Angeles 13: Pacific Foam Products Company • FLORIDA, Tampa: The Soule Company • GEORGIA, Atlanta 8: Badham Sales Company • ILLINOIS, Chicago 11: The Putnam Organization, Inc. • IOWA, Des Moines: Wilson-Rogers, Inc. • KANSAS, Kansas City: Styro Products, Inc. • MASSACHUSETTS, Ipswich: Atlantic Foam Products Company • MICHIGAN, Detroit: Par-Foam, Incorporated • MICHIGAN, Midland: Floral Foam Products • MINNESOTA, Minneapolis 8: Edward Sales Corporation • MONTANA, Billings: Madden Construction Supply Company • NEW YORK, Rochester 20: William Summerhays Sons Corp. • NEW YORK, Long Island City 1: Styro Sales Company, Inc. • OHIO, Cincinnati: The Seward Sales Corporation • OHIO, Cleveland 3: Structural Foams, Inc. • PENNSYLVANIA, Plymouth Meeting: G & W H Corson, Incorporated • TEXAS, Houston: The Emerson Company • UTAH, Salt Lake City 10: Utah Lumber Company • WASHINGTON, Seattle 9: Wiley-Bayley, Inc. • WISCONSIN, Milwaukee: S & S Sales Corporation • CANADA, Edmonton, Alberta: Northern Asbestos and Building Supply Co., Ltd. • CANADA, Kitchener, Ontario: Durofoam Insulation, Ltd. • CANADA, Vancouver, B. C.: Wiley-Bayley Co., Ltd. Or write THE DOW CHEMICAL COMPANY, Midland, Michigan—Plastics Sales Department 1744Z-1.

*STYROFOAM IS A REGISTERED TRADEMARK OF THE DOW CHEMICAL COMPANY

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New 16-page booklet tells why and where to specify latex paints

Now in one easy-to-use booklet you can get answers to your questions on latex paints—their uses, benefits and limitations. "Why and Where To Specify Latex Paints" was written to serve as a helpful guide for architects, specification writers and contractors.

This booklet answers such questions as: On what interior and exterior surfaces can I specify latex paints? Where should they not be specified? Why can they be applied over freshly dried plaster? Why don't surfaces need to be primed before latex paints are applied? Can coats of latex paints and oil paints be applied alternately in successive coats? What controls chalking in latex paints?

Get the answers now to these and the other questions you have about latex paints. For your copy of this booklet write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Plastics Sales Department 1836VV.

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In planning this outstanding school, the architect looked far ahead to possible future needs. As a result, it will not soon be outmoded either in appearance or in practical provisions for the ever-changing requirements of new courses and new methods of instruction. It looks to the future, too, in every item of equipment, including door closers.

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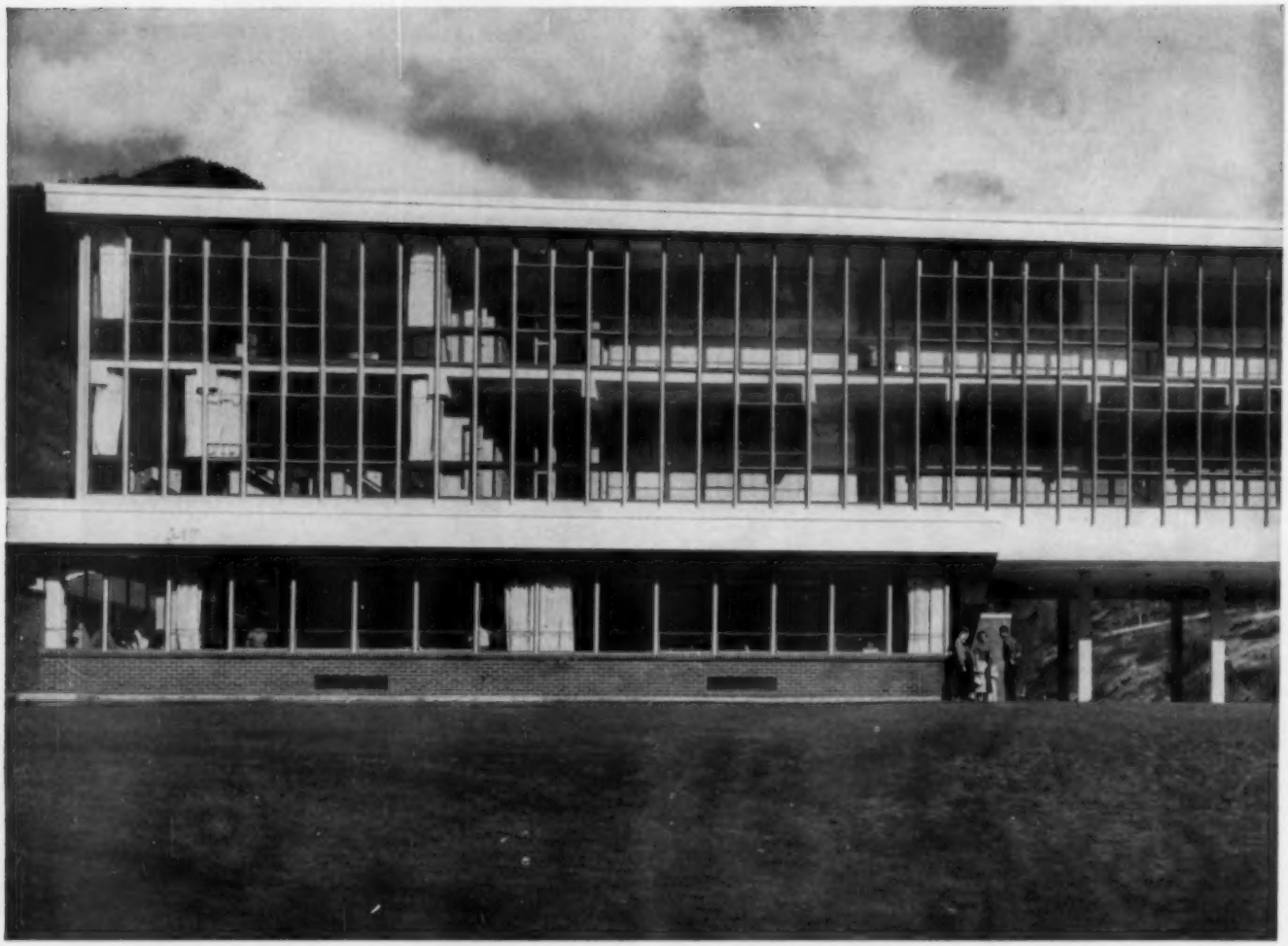


WALLS OF WEATHERTIGHT

Ready for the Lupton Windows. Completed installation of outer mullions before erection of Lupton Windows. Notice outstanding simplicity—the windows themselves become the walls in this all-Lupton installation.

Fast, clean installation. Lupton Metal Windows are delivered ready for immediate placement. With mullions in place, workmen put up Lupton window sections from within building—fast, inexpensively.

Adjustable ventilation. Projected in at bottom or out at top, these Lupton Windows provide immediate controlled ventilation with maximum light, are tight-fitting and rattle-free.

KELLOGG HIGH SCHOOL, Kellogg, Idaho. Architects: Culler, Cole, Martell & Norrie, Spokane, Wash.; Perkins & Will, Chicago, Ill. Contractor: Johnson-Busboom-Rauh, Spokane, Wash. Photograph by Hedrich-Blessing.

LUPTON METAL WINDOWS

bring maximum light and air to Kellogg High School

With this ultra-modern consolidation school the community of Kellogg, Idaho, voices its pride and civic-mindedness. Thanks to these walls of LUPTON engineered metal windows, bountiful ventilation and light are made available throughout the building.

Working together with school authorities to typify community solidarity, the architects conceived this building design which embodies a continuous wall of windows. Bright yellow-painted steel mullions and red muntins provide a joyful frame to the impressive view through the 513 LUPTON Steel Architectural Projected Windows.

Certain extreme climatic conditions (wind and dust storms; smoke from nearby Bunker Hill smelter; a wide variance in atmospheric temperatures) made the selection of materials unusually important. Ruggedness and simplicity characterize the construction, and are epitomized in the modern, precisely-engineered walls of tight-fitting LUPTON Windows.

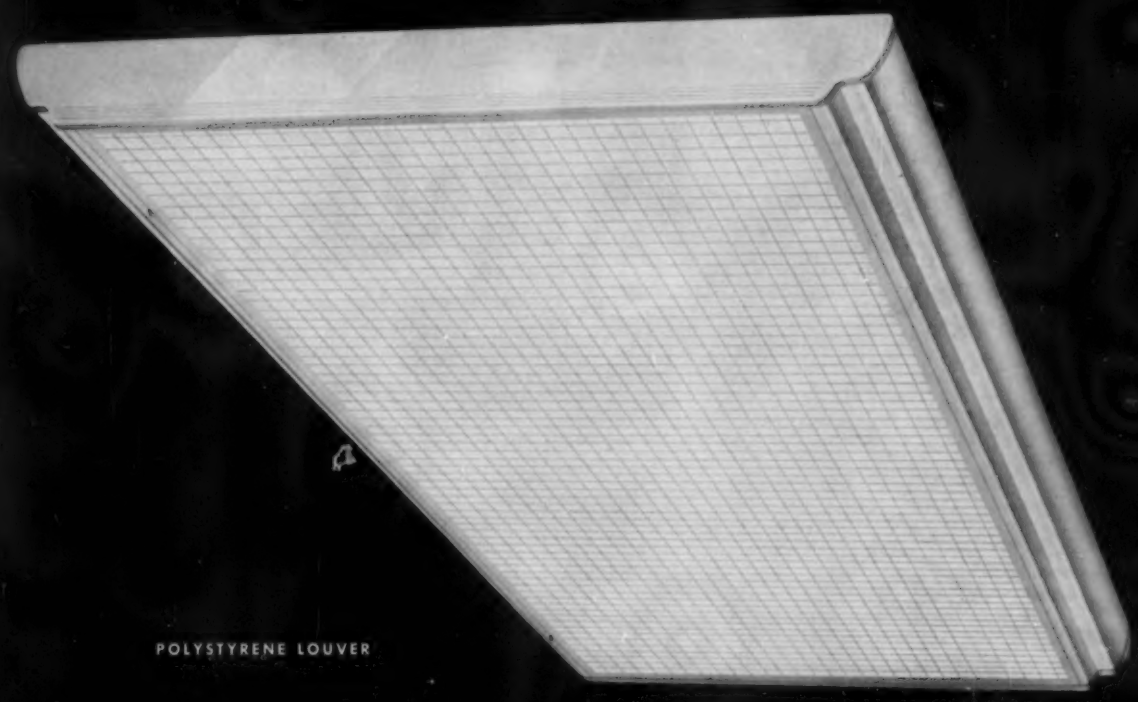
The Kellogg High School project reflects a growing movement towards the use of entire walls comprised of LUPTON Windows in schools, hospitals, and other modern buildings. LUPTON's 75 years' experience in metal-window and curtain-wall manufacture merits your complete investigation—look first in the *Architectural File* (Sweet's) for the Michael Flynn Catalog, and then consult the Yellow Pages under "Windows—Metal." Or write for specific additional information on LUPTON Metal Windows and Aluminum Curtain-Wall Systems.

LUPTON

METAL WINDOWS AND CURTAIN WALLS

MICHAEL FLYNN MANUFACTURING COMPANY
Main Office and Plant: 700 E. Godfrey Ave., Phila. 24, Pa.

CONGRATULATIONS, AIA! Michael Flynn Manufacturing Company joins the other members of the Producers' Council in extending best wishes on the occasion of your 100th anniversary celebration May 14-17.



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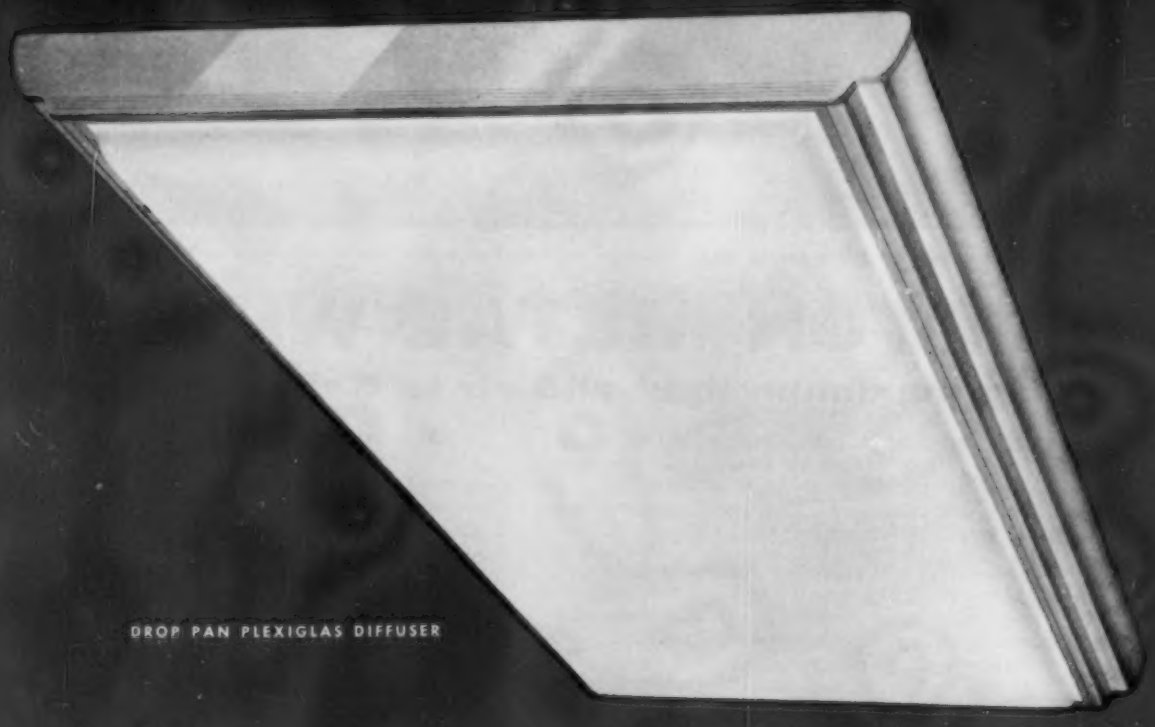

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Gibson LIGHTING

GIBSON MANUFACTURING COMPANY

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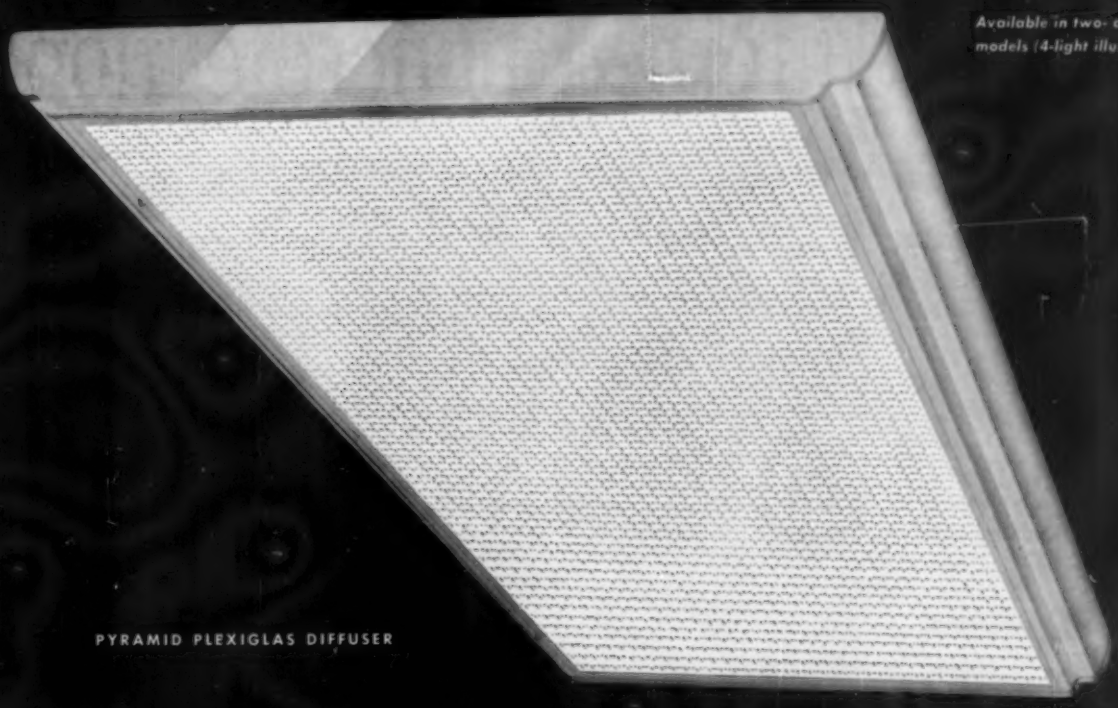

Available in two- and four-light models (4-light illustrated).

PYRAMID PLEXIGLAS DIFFUSER

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A fixture of incomparable beauty, designed expressly for low-ceiling application. Measures only 2¾" in depth and features exclusive parabolic reflectors which provide a smooth, shadowless panel of light.

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You really ought to know more about it—so why not drop us a line now for complete information on the Ceilo-35?

* *Patent Applied For*

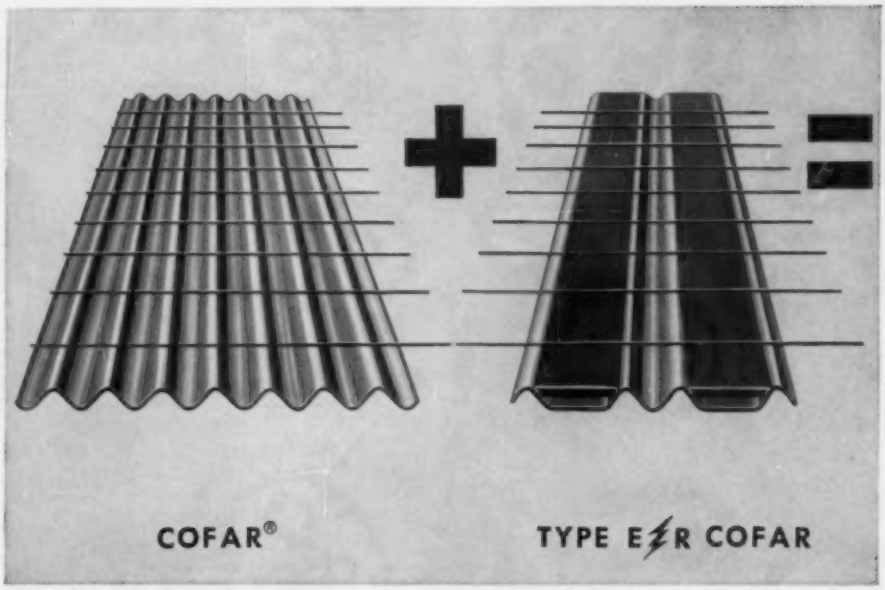
1913 Piedmont Circle, N.E., Atlanta 9, Georgia

New reinforced concrete floor

Why didn't someone think of this before! One simple, cost-cutting operation, yet it combines 3 major steps in the construction of office building floor slabs—

1. **Forming**
2. **Reinforcing**
3. **Electrification.**

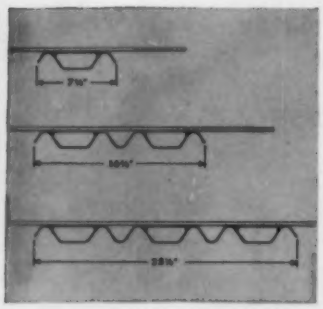
Heart of the system is Type E-R (for "Electrically Ready") Cofar, new cellular units designed to carry wiring. When these cells are combined with Cofar—a unit that forms and reinforces concrete—all 3 slab requirements above are met *before concrete is placed!* Chief advantages: A low-cost, high-strength floor with electrical flexibility that meets the present and future demands of *any* office building. No wasted fill. No wasted ducts or wiring. Fewer construction steps. Here's how it works . . .



Conventional Cofar units are deep-corrugated high-strength steel units—2½ feet wide—with transverse wires welded across corrugations. The steel serves as a tight form for wet concrete and becomes main positive reinforcement when concrete sets. T-wires furnish necessary temperature reinforcement and mechanical anchorage between slab and steel.

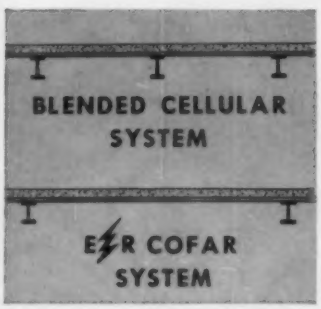
E-R Cofar cells are used between conventional Cofar units. These cells are wide troughs *capped* to form spacious 5.2 square inch raceways for wiring. NOTE: E-R Cofar units also have T-wires welded across corrugations to maintain Cofar composite slab action. Type E-R Cofar is equally suited to steel or concrete frame construction.

CHECK THESE MONEY-SAVING ADVANTAGES OF THE E⚡R COFAR SYSTEM



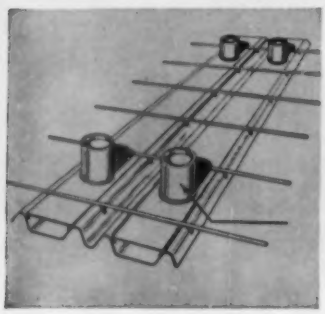
1, 2 or 3-Cell Units

With E-R Cofar, you *choose* the amount of electrification you want. One, two and three-cell units are available and spacing between units may be varied as necessary. Units are available in lengths to 16 feet and are manufactured from heavy gage galvanized steel.



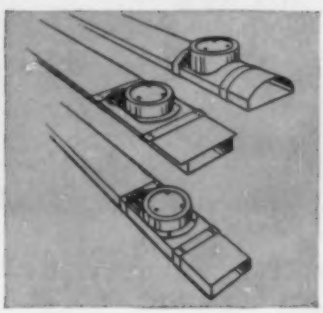
Reduces Framing

Cofar slabs are more economical than any other type of floor forming and deck system on 10′ to 14′ beam spacings. Wide spacing eliminates need for intermediate beams, saves on fire-proofing materials. Lighter dead loads also save on footings and foundations.



Pre-Set Inserts

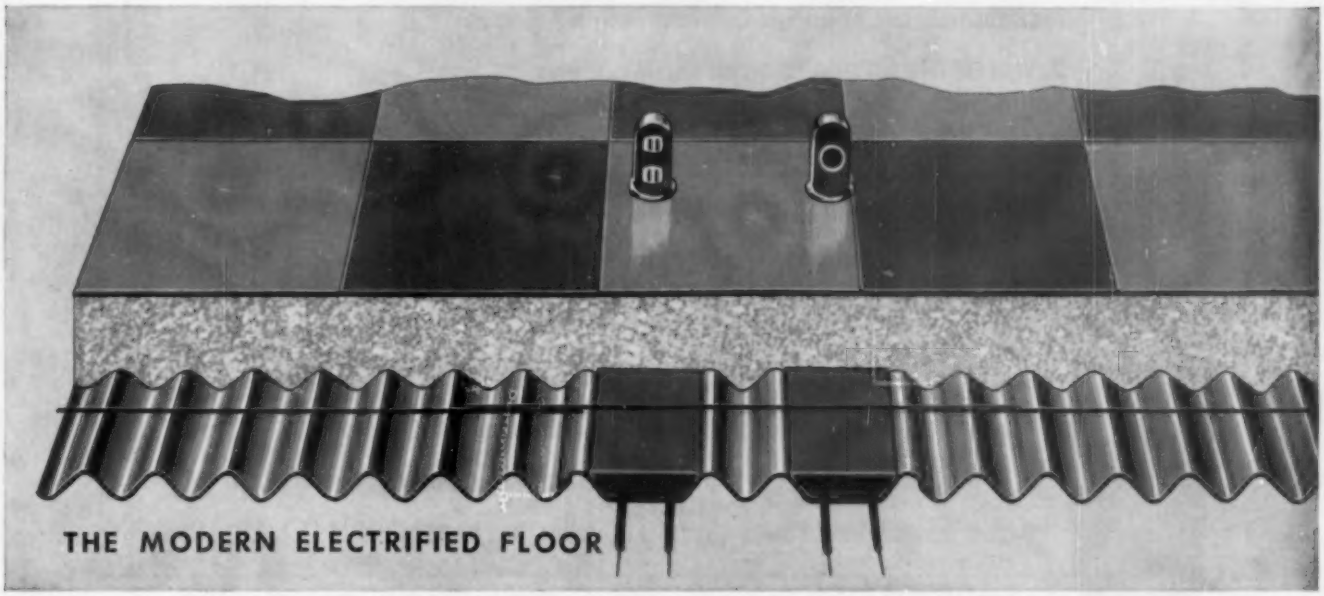
Available with either pre-set or with blank cap plate for after-set inserts, E-R Cofar provides complete electrical accessibility. Pre-set inserts eliminate noisy and costly concrete drilling operation. If desks are rearranged, floor service outlets can be located in *minutes*.



Header Adaptability

Any Underwriters' Laboratories-approved header duct system (such as Nepco or Walker) can be used to activate Type E-R Cofar cells. When two or three-cell units are used, service fittings can be placed as closely as 8 inches apart on the finished floor (see above).

system is completely electrified



In the finished system, E-R and conventional Cofar units work together to provide a superior reinforced concrete floor with complete electrification. A network of E-R cells—placed where you want them—assure electrical flexibility for the life of the building. Wires are pulled through the raceways and brought to desks and machines no matter where they are located. At the same time, Type E-R Cofar floor slabs retain all the advantages of reinforced concrete. Concentrated loads are distributed by the 2-way slab action of high-strength Cofar floors. Structural tests verify the ultimate strength to be 7 to 10 times design load. Use of 1.5 oz. hot-dip galvanized coating guarantees building life permanence. Type E-R Cofar floor slabs offer a low-cost, high-strength floor which is always "electrically ready."

UNDER CONSTRUCTION . . .

E-R Cofar has been specified for the Fidelity National Bank Building in Baton Rouge, La.

Architects: Wilson & Coleman
Contractor: L. W. Eaton Co., Inc.
Structural Engineer: Metrailer & Ingram
Electrical Engineer: Chesson, Forrest & Holland
Electrical Sub-Contractor: Sachse Electric Company
(*All firms located in Baton Rouge, La.*)

See all Granco catalogs in Sweet's Architectural and Industrial Files

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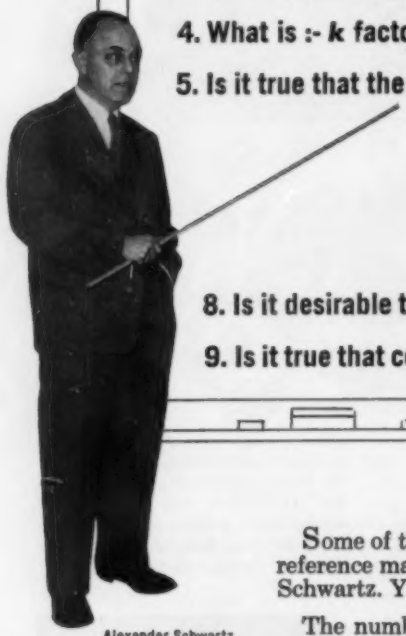
These are important problems! DO YOU KNOW THE ANSWERS?

1. **Does BRONZE or ALUMINUM paint on an IRON radiator improve or impair its performance?** (19, 20, 22)
2. **Will ORDINARY paint on an IRON radiator improve or impair its performance?** (19, 20, 22)
3. **Is it true that ICE radiates heat at a greater rate than a stove?** (17, 18, 22)
4. **What is :- *k* factor? C factor? Btu? U factor? R factor?** (17)
5. **Is it true that the loss of each lb. of vapor represents a heat loss of 1060 Btu's, or TEN TIMES that which raises the temperature of 1 lb. of water 100°F?** (5)
6. **Does insulation KEEP OUT THE COLD?** (17, 3)
7. **Do thermal insulations create heat?** (3)
8. **Is it desirable to place vapor barriers on both sides of an insulation?** (5)
9. **Is it true that cold does not flow to warm, but heat to cold?** (17, 18, 19)



Alexander Schwartz, writer and lecturer on heat flow, vapor flow, and condensation.

Some of the answers may surprise you! Look them up in a handy, *new* reference manual, "Heat Flow by Radiation in Buildings," by Alexander Schwartz. You may obtain the booklet *free!*

The numbers above refer to pages in this *important contribution* on the theory and practice of insulating against heat and vapor flow, and against destructive condensation. It is replete with simple, illustrated explanations of how to solve many usual and unusual heat flow and fuel problems; also illustrates many new installation techniques.

The author is a well-known lecturer in the field of heat and vapor flow, and thermal insulation. He is president of Infra Insulation, Inc. and author of "Simplified Physics of Vapor and Thermal Insulation," which has been used for years as a text in universities, technological institutes and colleges, and as a valuable reference by architects, engineers, and builders.

In this one handy booklet of 48 pages are assembled and presented in clear, concise, easy-to-follow language:—facts; figures; reports of practical experiments and scientific theories obtainable otherwise only through years of study and consultation of hundreds of books and other publications. It is generously illustrated with drawings, photographs, diagrams, charts.

"Heat Flow by Radiation in Buildings" is yours, FREE, for the asking —Just use the coupon, and get the "answers"!

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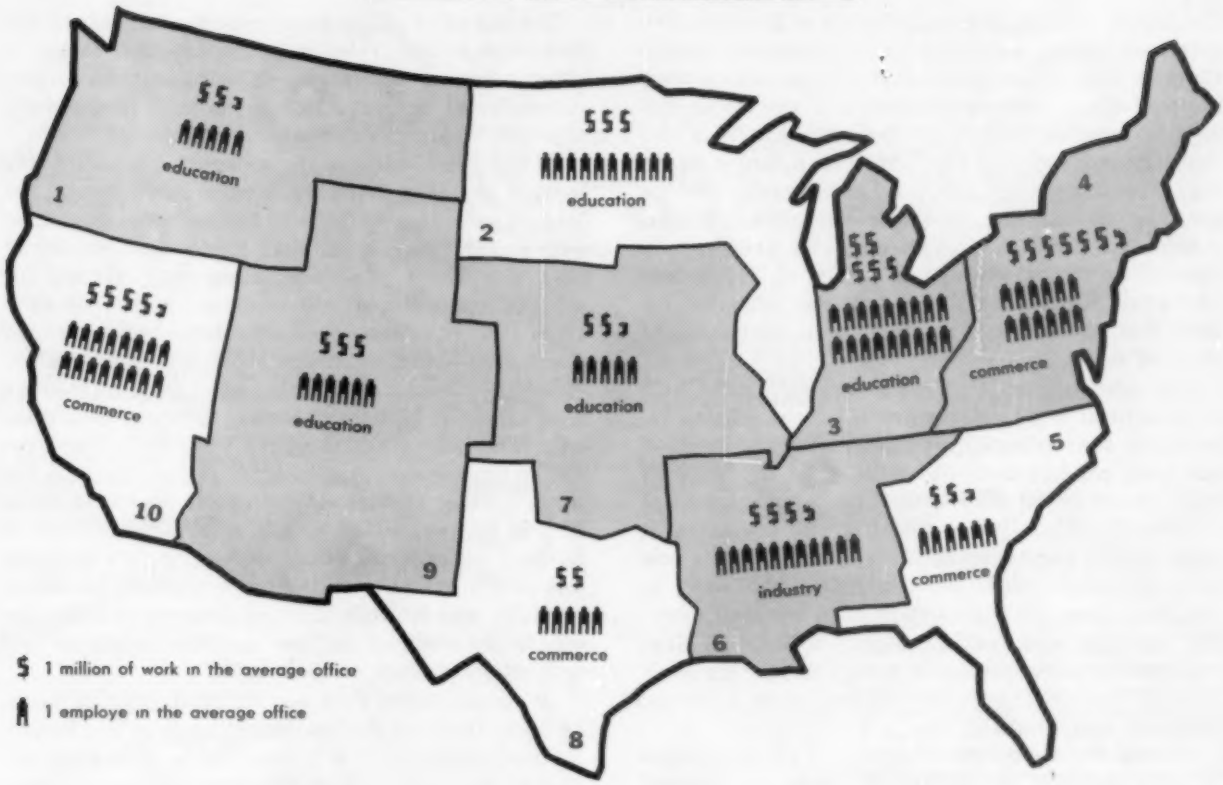
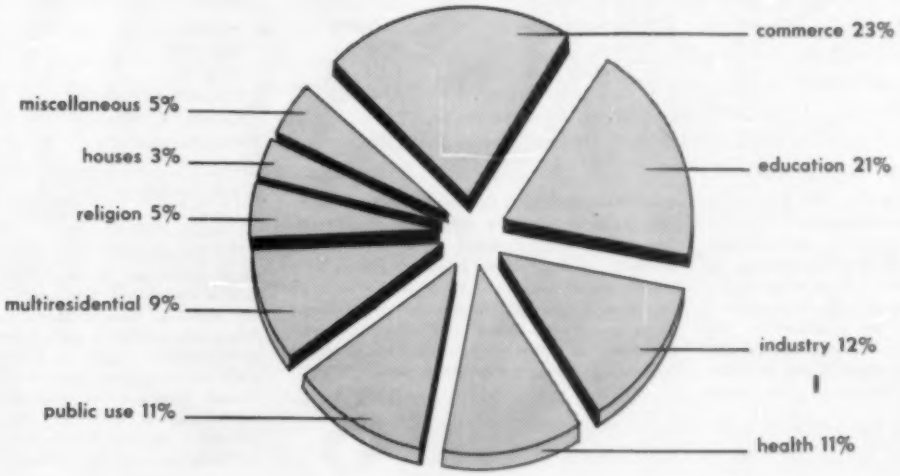


BUSINESS IN ARCHITECTURAL FIRMS TO RISE 5.2% IN 1958

Design for Commerce leads all other categories of building in P/A's annual Forecast based on returns of the eighth Annual Business Survey of the architectural profession. Proportions of architects' activities are shown (below) on the "pie" chart. On the map (above) showing the 10 regions of the country, each $ symbol indicates the $1-million volume of work currently on the boards of the average architect in that region; figures indicate average number of employes in the average office in that region; and the type of building named represents the largest dollar volume in that region. The shaded regions reported an increase over last year's architectural activity; the unshaded regions reported a decrease.

Details and tabulations of the Annual Business Survey, as computed and analyzed each year for our professional audience, are offered on the following pages.



P/A BUSINESS FORECAST FOR 1958

The eighth Annual Business Survey of the architectural profession conducted by PROGRESSIVE ARCHITECTURE indicates a stable over-all situation within the profession, and foreshadows a larger dollar volume of construction in the period ahead than the industry enjoyed this year—in fact, a larger figure than that shown in any previous Survey. On the drafting boards and in the specifications departments of the nation's architects there are projects amounting to an average per firm of $4,339,000. Last year, at this time, the average was $226,000 less than this; thus there is an increase in the volume of work of 5.2%.

The accuracy of P/A's Survey, in which 1062 architectural firms co-operated this year (Table 1), has been demonstrated repeatedly over the years it has been conducted. Since it is based on reported *facts* (work in the office at the time the response was prepared) rather than guesswork and estimates, it is a sensitive barometer of work ahead. What is now being designed will be built in 1958—50% early in the year, since that proportion is in working drawing and final specifications stage; 50% later, since that part is in a preliminary design stage. This 50-50 ratio seems, from previous studies, to be a normal situation and a healthy one.

Almost the same ratio of work for private clients vs. commissions for municipal, state, or Federal agencies as in the last few years is also indicated: 54.4% private against 45.6% public.

The big news in this year's results (aside from the fact that architect-designed construction seems to show a larger percentage of increase than is predicted for *all* construction) is the shift in dominant types of buildings commissioned (Table 3).

Commercial work is the category producing the largest dollar volume nationally, and hence the largest percentage (23%) in the average office. Last year and the year before that, Educational work had been the leader. In 1958, apparently, design for schools and colleges will remain heavy (the drop from 1957 is a fraction of a percent) but design for Commerce—office buildings, shops and stores, banks, etc.—has risen by a whopping 47%, from an average firm's total of $676,000 last year to $998,000 at present. The only other category to show a rise over 1957's average volume reported is Health; here the large number of doctors' clinics and health facilities of other types, added to the continuing activity in hospital design brings the reported figure well above last year's average. In the other types of buildings, Industry and Multiple Housing dropped sharply; the others show slight declines in dollar averages and percentage of work on the boards.

In recent years, P/A has dropped Defense work, as such, from its studies, including it in the Miscellaneous category. It is interesting to note, however, that of the 5.2% of Miscellaneous work in the average office approximately half—an average volume of $117,000—is design for the armed services. The

Table 1
Number of Firms Reporting and Regional Distribution

Region	% of Firms
1 Northwest	4.2
2 North Central	11.6
3 Great Lakes	10.4
4 Northeast	26.1
5 Southeast	9.8
6 Gulf States	5.6
7 Central States	7.5
8 Texas	5.6
9 Western Mountain	7.2
10 California-Nevada	12.0
	100.0

Valid returns in P/A's Survey this year were 1062 in number (approximately 100 more were incomplete, or reported retirement). Regional distribution is not necessarily an exact indication of distribution of practice, but comes very close to it. A somewhat greater concentration of practice in the Northeast and in California is indicated this year, with an increase also in the Western Mountain region. No decreases seem to be significant.

Table 2
Average Dollar Volume by Regions

Region	Average $ Volume
1 Northwest	2,437,000
2 North Central	3,146,000
3 Great Lakes	5,177,000
4 Northeast	6,847,000
5 Southeast	2,518,000
6 Gulf States	3,877,000
7 Central States	2,608,000
8 Texas	2,103,000
9 Western Mountain	3,055,000
10 California-Nevada	4,607,000
National Average	$4,339,000
National Median	$1,500,000

Northeastern States report the largest average volume of work this year. California, last year's leader, drops to third place. An analysis of the returns shows medians very close in all regions, with differences in averages being due to presence or absence of large-volume firms. In California's case, a number of those very large firms reported appreciably less business this year.

Table 3
Dollar-Volume Averages and % Distribution of Work by Types of Buildings in All Regions

Type	% of Average Architect's Work	$ Volume Average Office
Commerce	23.0	998,000
Education	20.7	899,000
Health	10.7	463,000
Industry	12.1	524,000
Public Use	11.6	502,000
Religion	4.9	213,000
Residential (Multiple)	9.1	395,000
Residential (Private)	2.7	117,000
Miscellaneous	5.2	228,000
Total (average office —all regions)	100.0	$4,339,000

Most significant trend in this year's Survey is that Commerce has outstripped Education, for the first time in three years. However, Education remains at almost the same dollar-volume figure as a year ago, and the gain is at the expense of other categories. Health design has gained, and Defense work (about half of the Miscellaneous category) is significant. All other types of building showed decreases.

Table 4
Activity of Architectural Firms in Types of Buildings

Types of Buildings	% of Architects Reporting Current Work
Commerce	49
Education	50
Health	24
Industry	25
Public Use	29
Religion	45
Residential (Multiple)	20
Residential (Private)	49

This table indicates the number of firms, by percentage of the total, reporting current work in the various building categories. Note that approximately half the architects' offices have projects in Commerce, Education, and Private Residential, and 45% have Religious commissions. There would seem to be a good general distribution of type of practice, despite the growing concentration indicated by Table 5.

Table 5
Specialization of Architectural Firms

Types of Buildings	% of Firms doing only this type
Commerce	2.2
Education	3.5
Health	.8
Industry	.5
Public Use	1.1
Religion	1.4
Residential (Multiple)	.7
Residential (Private)	3.5
Total Specialists	13.7

The number of firms reporting only one type of building in the office seems to be increasing. Greatest increase is in the Commerce "specialist" but the architect doing only Health design is also becoming a significant factor. Other percentages are close to last year's report.

Table 6
Sizes of Architectural Firms

Size of Firm by Number	% of National Total
Up to 4 employes	58.1
5 to 9 employes	21.4
10 to 19 employes	11.8
20 to 39 employes	5.2
40 to 99 employes	2.2
100 and more employes	1.3
	100.0

Average number of employes: 10.5
Median number of employes: 4

Size of Firm by $ Volume of Work on Boards	% of National Total
Under $1 million	43.3
$1 million to $10 millions	48.1
$10 millions to $50 millions	7.1
Over $50 millions	1.5
	100.0

The remarkable thing about this double table is that percentages have changed so little—over a number of years—despite the steadily rising dollar-volume averages. A slight percentage increase in the number of very large firms, which has occurred, can of course account for average-volume increases. The fact that average number of employes, as well as the median, has remained almost constant over four years must indicate a growing efficiency of "production" in the offices. To put this in a crude statistical fashion: one employe today is needed for $413,000 of current work, where four years ago one was being used for each $335,000 on the boards.

second largest single item in the Miscellaneous group is design for Recreation.

Comparing regions on the basis of volume of work (Table 2), the three consistent leaders in P/A's Surveys—the Northeast, the Great Lakes area, and California-Nevada—still lead, in that order. It is interesting that California, which jumped into first place last year, has again dropped to third. This is accounted for specifically by the larger firms, which last year reported volumes of business appreciably in excess of the present reports.

The average size of architectural firms does not seem to change greatly. As the average dollar volume reported has increased in recent years, the average number of employes and the median number have moved up only fractionally. The average of 10.5 employes, and the median of 4, are precisely what they were last year. However, sizes of firms range greatly, of course, and *average* sizes seem to differ from region to region (Table 7). This year, the largest firm, as average, is in the Great Lakes region; California is next, then the Northeast. Does this reversal of leadership as compared to dollar-volume activity indicate that the Eastern firm is more efficiently producing its largest volume of work? The span from largest to smallest average is rather great—18 in the Great Lakes area to an average of 5 in Northwest, Central States, and Texas. Nationally, the comparative sizes of firms reporting, studied by number of employes and volume of work on the boards, are not greatly different from past recent years (Table 6). A fraction over 1% are the great firms employing more than 100 people; the bulk of the profession is in offices of less than 10 people; more than half of the firms employ four or less. A fraction more than 1% also have more than $50 millions of work going; the bulk of the profession has less than $10 millions. None of these percentages have varied by more than one or two points.

Although the percentage of firms engaged in each of the categories of building has scarcely changed (Table 4), an interesting phenomenon is the slowly but appreciably increasing percentage of "specialists." Firms reporting only one type of building in the office (Table 5), which grew last year to 11.8% (from a previous-year figure of 6%) has now crept

up to 13.7%. This seems to be reaching a significant total, and the table indicates that it is not confined to any one building category, even though houses (often the solo work of the beginning firm) and schools account for about half of these single-interest firms.

Running through this year's Survey there are indications—subtle, and perhaps insignificant in themselves—which may add up to a story of headaches for some, prosperity for others. The picture of activity is spotty in several ways which the study of averages or even medians would not indicate. For example, the shift in dollar volume by building types, considered with the number of one-type offices, hints at certain troubles; the school firm having to seek commercial work; the apartment-house specialist finding that particular activity is dropping in his area. Perhaps the clearest indication of this is the optimism/pessimism picture (Table 8). This year, 61% of the respondents are doing more work than they did last year; that is a 3% drop from the number reporting increases last year. The number with less work than a year ago is now 28% of the total; that is an increase of 18% over the number who reported this sad fact a year ago. The proportion reporting the same amount of activity has dropped slightly. These figures would seem to indicate that the reported dollar-volume-average increase is due to some firms (still a large proportion of the total) doing very well indeed, with some (still a minority) suffering some distress. This observation would seem to be borne out by individual reports to P/A and a study of comments and remarks appended to the Survey returns

Table 7
Average Size of Office by Regions

Region	Average Number of Employes
1 Northwest	5
2 North Central	10
3 Great Lakes	18
4 Northeast	12
5 Southeast	6
6 Gulf States	11
7 Central States	5
8 Texas	5
9 Western Mountain	6
10 California-Nevada	16

These regional averages, published this year for the first time, may provide production-minded office managers with some statistical speculation. If one compares this Table with Table 2—dollar-volume averages by regions—it is apparent that the volume/employe ratio varies greatly. The Northeast is most "efficient" in this regard: $570,000 of work per employe. The Great Lakes area and California have the lowest volume per employe: around $290,000. The conclusions should be evaluated carefully, however, for special circumstances; for instance, the firm between jobs, or in a decreasing-work situation is naturally going to show a low ratio of productivity for some time.

Table 8
Increase or Decrease in Work

Region	% of firms doing more work than this time last year	% of firms doing less work than this time last year	% of firms doing same volume this time last year
1 Northwest	54	26	20
2 North Central	62	23	15
3 Great Lakes	64	27	9
4 Northeast	62	28	10
5 Southeast	65	27	8
6 Gulf States	61	30	9
7 Central States	56	30	14
8 Texas	68	26	6
9 Western Mountain	62	30	8
10 California-Nevada	58	30	12
National Total	61	28	11

UNESCO—Marc Riboud

p/a news bulletins

• National Trust for Historic Preservation has received two grants totaling $2½ millions from Old Dominion Foundation and Avalon Foundation toward $10-millions endowment goal, reported David E. Finley, Chairman of Board of Trustees, at Salem, Mass., meeting of 450 members. Group offers assistance—technical, advisory—to local, regional groups in administration of historic structures.

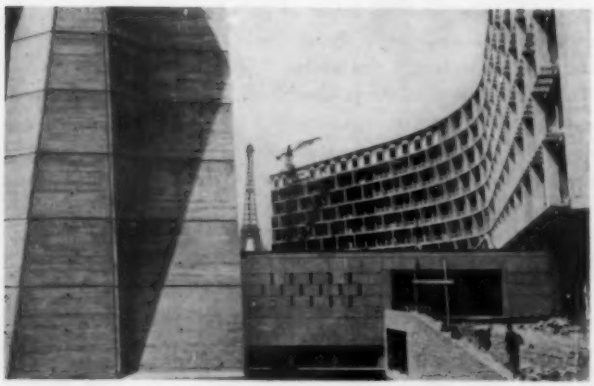
• Among conventions of interest to architects, engineers, and scheduled for November are: Structural Clay Products Industry, Nov. 11-13, White Sulphur Springs, W. Va.; National Association of Real Estate Boards, Nov. 2-7, Chicago.

• Long-debated Lincoln Square redevelopment project in New York has been approved by City Planning Commission and recommended for adoption by Board of Estimate on grounds that vast project "affords the City a rare opportunity" to establish important cultural center and eliminate a substandard-dwelling area.

• Effective December 1, new head of Department of Architecture, University of Florida's College of Architecture and Fine Arts will be James T. Lendrum. . . . Charles M. Kelley has been named Head Professor of Architecture at Alabama Polytechnic Institute. . . . New appointments to Department of Architecture, College of Architecture and Design at University of Michigan include: Franco Paolo Fanelli, Harold William Himes, Robert Bruce Lytle, Jr.—Assistant Professors of Architecture; Martin Chandler Growald, William Beckley Hayward—Instructors in Architecture; Lester Fader, Serenus Glenn Paulsen—Visiting Lecturers.

• Minoru Yamasaki, of Yamasaki, Leinweber & Associates, architects-engineers, Royal Oak, Mich., was recently appointed to Board of Governors of BRI. . . . California Council, AIA, has awarded Certificates of Distinguished Service to: Joseph L. Echler, Earl T. Heitschmidt, Donald B. Kirby, John L. Reid for contributions to architectural profession.

• Louis R. Howson assumed presidency of American Society of Civil Engineers Oct. 16, succeeding Mason G. Lockwood.



. . . Arthur F. Hubbard will be new chairman of Technical Advisory Committee on Sound and Vibration Control of American Society of Heating and Air Conditioning Engineers.

• 7th Annual School Design Competition, sponsored by The School Executive, for educational buildings under construction during 1957 has been announced. Closing date: March 1, 1958. For information write: Walter D. Cocking, The School Executive, 470 Fourth Ave., New York 16, N. Y.

• Sponsorship of International Program of The Museum of Modern Art, New York, has been assumed by newly formed International Council after initial five-year grant from Rockefeller Brothers Fund ended. Directed by Porter A. McCray, Council, in association with Rockefeller Brothers Fund, will endeavor to continue and expand International Program fostering international exchange in contemporary visual arts.

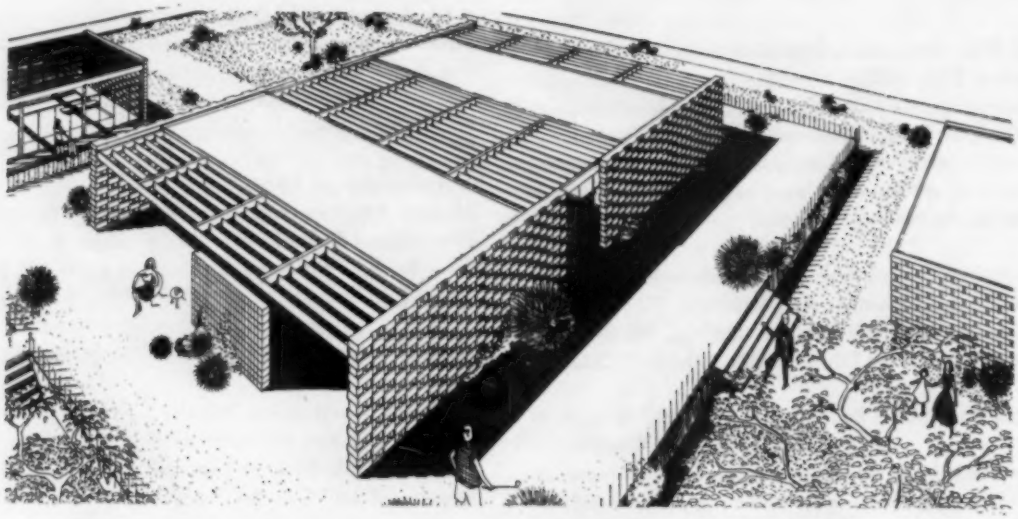
•National Construction Industry Conference, meeting Dec. 11-12, in Chicago, will feature Felix Candela, Mexican architect-engineer-builder, as principal speaker. Theme of conference will be "Creative Trends in Structural Design."

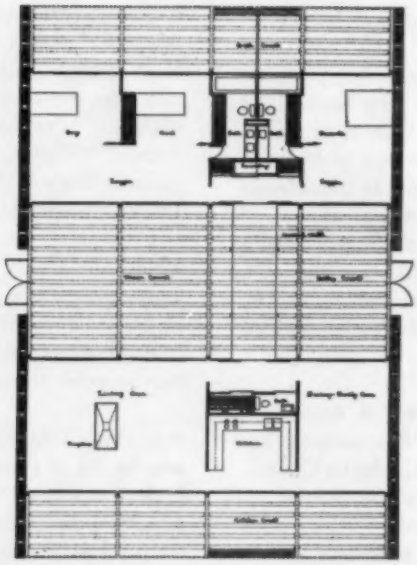
• Kenneth Alexander Smith has been appointed assistant dean of School of Architecture, Columbia University, to assist Dean Leopold Arnaud with administration of school. . . . Also announced are winners of William Kinne Fellows Memorial Traveling Fellowships; Leslie Feder, Gabriel D. Gibson, William E. Gindele, Michael Kaplan, Robert J. Piscioneri, Gaetana Scutaro, George H. Weitzman, George Yourke, Raymond Lifchez, Sigurd Grava, Joseph K. Murphy.

• Henry L. Livas, Associate Professor of Architecture and Engineering, Hampton Institute, has been elected president of National Technical Association, succeeding James C. Evans, Washington, D. C. Group works to encourage young men to enter technical, engineering fields.

• Psychiatric Architecture Design Contest, open to students and faculty of schools of architecture, is Architectural Study Project sponsored by American Psychiatric Association and AIA. Purpose of competition is to obtain suitable standards for psychiatric architecture. For information, write: Charles E. Goshen, M.D., Project Director, American Psychiatric Association, 1785 Massachusetts Ave., Washington 6, D. C.

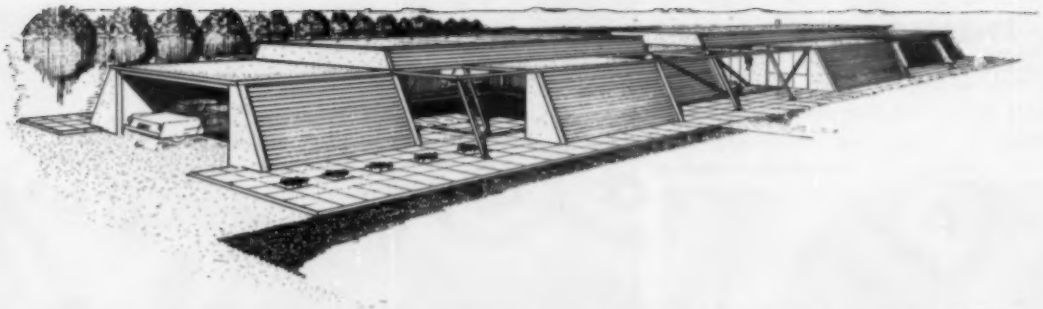
• The much-heralded new Paris headquarters (left) for UNESCO is now beginning to take final form on its seven-and-a-half-acre site on the Left Bank, not far from the Eiffel Tower. Two main buildings comprise the complex—the limit-height, 7-story Secretariat, with its distinctive Y-shaped plan; and (on a plaza adjoining the curve of one arm of the "Y,") a low, trapezoidal-shaped building with a copper-surfaced, pleated roof, that houses conference halls and services. Group was designed by an international team of Architects: Bernard Zehrfuss, Pier Nervi, Marcel Breuer. Their plans were then approved by another international panel of distinguished Architects: Lucio Costa, Walter Gropius, Le Corbusier, Sven Markelius, Ernesto Rogers. Chief Engineer in charge of on-site building operations is Architect-Engineer Eugene H. Callison.

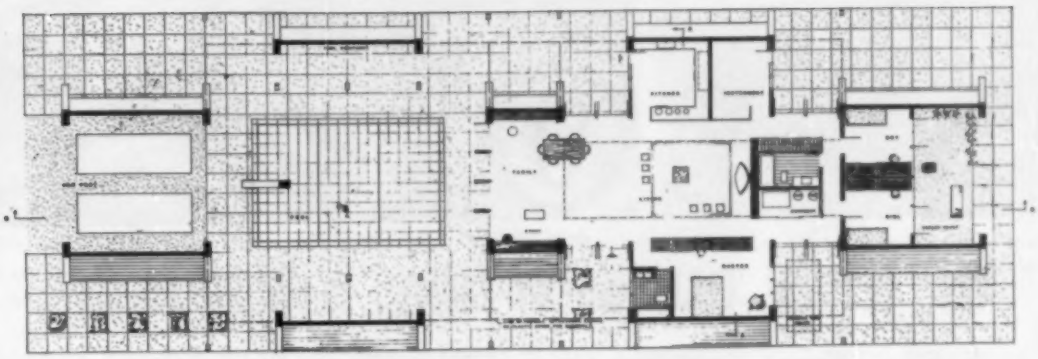


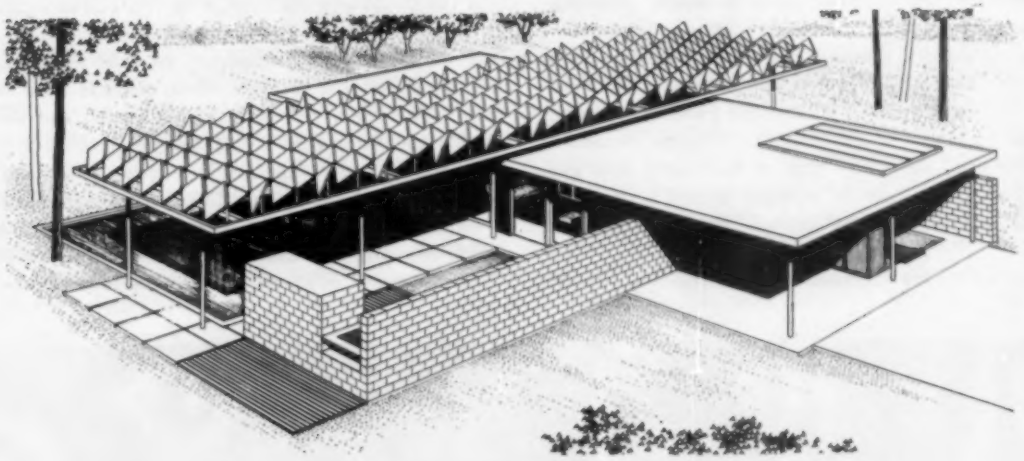


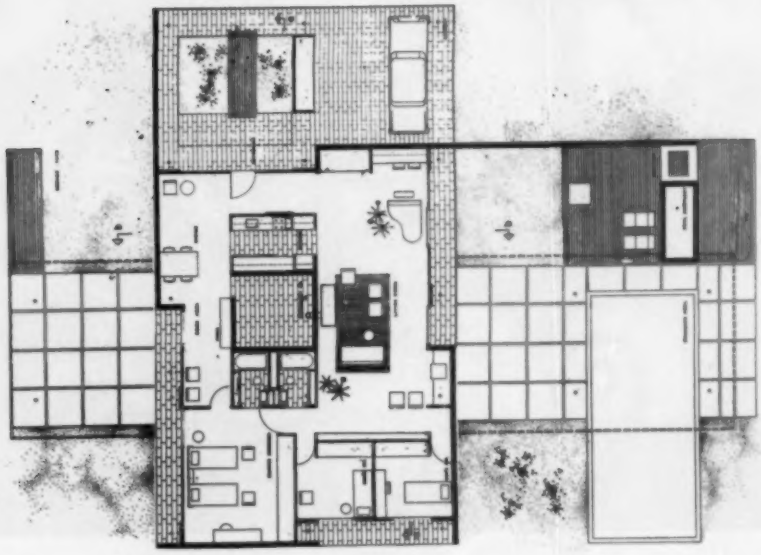
WINNERS OF SOLAR HOUSE COMPETITION ANNOUNCED

The outcome of a competition for an Arizona residence adapted to "living with the sun" has recently been announced. Sponsor of the International Solar House Architectural Competition was the Association for Applied Solar Energy. The Jury included Dean Pietro Belluschi of MIT, chairman; Carlos Contreras, Architect, Mexico; Thomas Creighton, Architect and Editor PROGRESSIVE ARCHITECTURE, New York; James Elmore, Architect, Phoenix, Ariz.; Nathaniel Owings, Architect, San Francisco. James H. Hunter, Architect, Boulder, Colo., was professional advisor. First prize (above), $2500, was awarded to Peter R. Lee, senior student in architecture at University of Minnesota. "Among the outstanding merits of the winning entry," commented Dean Belluschi, "were its directness and sense of unity, and the logic of its solar equipment, which acts in the double capacity of shade louvers in the summer and heat collectors in the winter." Second prize (acrosspage top), $1500, went to Anna Campbell Bliss, Architect, Minneapolis, Minn., for a design in which the solar collectors produce the architectural quality of the house. Two former students of the Graduate School of Architecture, MIT, John N. Morphett of South Australia, and Hanford Yang of China, were the recipients of the third, $1000, prize (acrosspage bottom). Fourth and fifth prizes, of $500 each, were awarded to I. C. Christensen of Arhus, Denmark, and Robert J. Pelletier of Beverly, Mass. Honorable mentions went to: Enis Kortan of New York; R. B. Maides and G. J. Shaw of Buffalo, N. Y.; Morton Karp of Mill Valley, Calif.

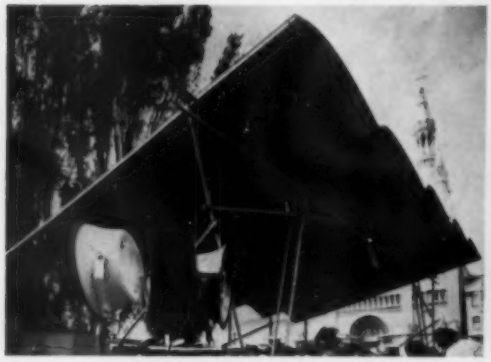








Photos: Joe Munroe



ARTS FESTIVAL ENLIVENED BY CURVED PLYWOOD FORMS

A striking feature of the 11th annual San Francisco Arts Festival, held recently in Washington Square, was a series of structures built with vaults or dome shapes of plywood. Most prominent was a 39-ft-diameter geodesic dome, developed by Designers George and Evelyn Kosmak and erected under supervision of Thomas E. Moore, of Shell Structures, Inc., licensee of R. Buckminster Fuller. This dome, which housed an exhibit of San Francisco Chapter, Industrial Designers Institute, was 19'6" high at the center and was built of 135 sheets of 1/4-in fir plywood lapped at the corners, shingle fashion, with the corners fastened with nuts and bolts.

Also designed by the Kosmaks, with the engineering staff of Berkeley Plywood Company (a component fabricator), were several plywood-vaulted structures. The one designed for the bandstand was composed of 5 butted vaults of sandwich construction, with light skins of plywood glued to curved framing and supported on light metal scaffolding. At the other side of the Festival grounds were two, vault-roofed pavilions, one for a textile exhibit and work of the California Association of Landscape Architects; the other, for entries of local artists in a competition for a mural destined for the city's new Civic Auditorium addition.

A smaller geodesic plywood dome, designed by Architects Marquis & Stoller and erected by Grae Structures, Inc., was shown as a possible do-it-yourself vacation cottage.

Washington report

by Frederick Gutheim

Some time this winter, Washington will have a new set of zoning regulations. Action has been suspended for nearly a year while a political battle about the future character of the city of Washington has raged. Last month's report of an advisory committee, added to earlier blasts against recommendations made by Zoning Consultant Harold M. Lewis, should lead the three Presidentially appointed District Commissioners (who govern the Federal city) to far milder conclusions.

The main issues revolve around the Central Business District. Fort Worth and other cities that have been really impressed with their difficulties have concluded that the CBD should be a dense pedestrian island, sharply defined, usually by a belt highway. And, as Victor Gruen has put it, the belt had better be tight—or the city is likely to lose its pants. The local philosophy, however, is that the CBD ought to be good and roomy, with lots of space for people to build big buildings as entrepreneurial considerations allow. In addition to a considerable expansion of the CBD recommended by Lewis, a huge new additional district would be added to the north of the CBD in which large buildings for the use of national organizations would be encouraged. (I have said something about the growth of labor-union headquarters here since the war, and will write shortly about the parallel growth of such organizations as The American Association of University Women, B'nai B'rith, and others that have recently built headquarters buildings in Washington.) Further distortion of the Lewis recommendations will result from a de facto increase in the height limitations that now exist, by exempting penthouse structures, enclosures for air-conditioning and other mechanical equipment. It is not only the densities which will result from these recommendations, but also the blighted areas that will be left between those which are allowed to develop within the zoning envelop, that will stamp the future character of Washington outside its strictly Federal areas. One can count on these being pretty well filled with parking lots and structures. Among the other changes being urged on the commissioners are a total elimination of Lewis' recommendations for the inclusion of off-street parking in new buildings in the Central Business District. A further recommendation would increase the allowable bulk of new buildings by nearly 50 percent.

District of Columbia Commissioners have issued a special order clarifying building regulations that foreign embassies have to observe. In the past, it has been assumed building and zoning laws could be ignored. The Commissioners now insist new embassy construction should conform—and has secured a promise of co-operation of the State Department in enforcing its new policy.

Inseparability of the architect from his camera is a well remarked phenomenon. Perhaps from this most photographed city, it is worth passing on an observation by A. J. Wedderburn, curator of photography, Smithsonian Institution, that too many pictures are taken here at the wrong time of day. This resourceful expert has prepared a list of major Washington landmarks, with suggested times of day for shooting them. It's a perfect organizer for the tourist's itinerary. If you'd like the list, a stamped return envelope sent to me at 1218 Connecticut Avenue, Washington 6, D. C., will do the trick.

Release of the report of the architects' advisory committee on the extension of the East Front of the Capitol has confirmed the earlier assumption that these consultants were obliged to limit their recommendations to carrying out an existing Congressional mandate. Perhaps Congress can now reconsider its hasty decision to desecrate this building. There can be no doubt this is what the advisory committee would like them to do. The best chance for this is some favorable action on a resolution introduced by Rep. Henry S. Reuss (Dem., Wis.) reopening the entire subject. If Congress can be assured that this action would not interfere with a prompt solution of its restaurant, parking and legislative privacy problems, this looks like a solution to the dilemma.

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p/a financial news

by William Hurd Hillyer

Likelihoods in household formation are preferred study subjects for the banking world, as well as among architects and their clients. A keen analysis has been completed by the Federal Reserve Bank of Richmond. That institution notes an economic chain reaction "second to none" as the result of population upsurge, the increase in households since 1947—a 27% gain compared with population's 19%—being most significant. The household formation "slump" after 1950, due to the decline in marriages and in the rate of "undoubling" has spent its force. The bank sees a "big boost" in the 1960's as stemming from a marked marriage upturn. "When the flood of postwar babies reaches marriageable age" household formation and the demand for housing "should surge strongly." Conclusions are reinforced by charts. "High projection" shows a yearly average annual increase of household formation during the first half of the next decade as reaching 833,000 with a 1,047,000 yearly average for the second half.

• Further evidence of inflation flattening comes to light in the fabricated aluminum field, following copper market weakness previously reported. Southwire Company of Atlanta has cut the prices of its fabricated products 15% to 20% in a stabilization attempt. Reynolds Metals has made substantial reductions of 4.6 cents a pound on special charges for extra large dimensions of nonheat-treatable alu-

minum alloy plate. As we go to press, other large aluminum producers are considering price reductions.

This sagging of commodity prices lends realism to the thesis that inflation may no longer be dominating the entire economic trend. Such is the conclusion voiced by Per Jacobson, managing director of the International Bank and Monetary Fund. Signs to which he referred include a downslide of the Government's daily index of wholesale commodities to 86% of the 1947-49 average, from a 135% high during the Korean War; Vice-President John D. Wilson of the Chase Manhattan Bank sees a tendency to "level out" and intimates that the inflation peak may have passed. Dun & Bradstreet's latest weekly review shows a 4.5 drop in wholesale price index; the only plus signs on that firm's statistical report are for business failures, electric power kwh, and bank clearings—up 10.8%, 2.9%, and 0.2%, respectively.

• Mortgage debt of individuals tapered off considerably during the first half of this year, the Securities and Exchange Commission announces, "thereby contributing to a greater total saving," which touched $9.2 billions for the period.

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new modular effort

by John L. Haynes

Managing Director, Producers' Council, Inc.

Two significant events have occurred within recent weeks which indicate that the efforts to gain acceptance for modular dimensional standards are proving successful. The first was the incorporation of Modular Building Standards Association. The second was recognition by American Standards Association of five men who have rendered continuous and significant service to this movement.

Receiving these honors and the accompanying Modular Awards will be Homebuilder Andrew Place, South Bend, Ind., for "Construction Procedures"; Architect John R. Magney, Minneapolis, Minn., for "Design"; former AIA-PC Modular Co-ordinator William Demarest, Jr., for "Education"; Manufacturer Neill Boldrick, Acme Brick Company, Fort Worth, Tex., for "Production of Modular Products"; and Publisher Perry I. Prentice for "Promotional Activities." The awards will be presented this month at ASA's San Francisco convention.

Since the late Albert Bemis first advanced his cost-cutting, modular concept, the idea of dimensional standards has fired the imaginations of many farsighted people in the building industry. Architects, builders, contractors, and manufacturers alike could look with envy at the progress being made by other industries, and realize that the key to their production miracles is their ability to work with component parts built to standard.

With the unleashing of the Depression-stymied and war-born demand for new homes, schools, factories, hospitals, office buildings, and other structures, the need to attain universal adoption of a dimensional standard in the building industry became acute. Accordingly, the AIA-PC Joint Committee undertook to promote the use of the four-inch module. To facilitate and co-ordinate its efforts, it established the Office of Modular Co-ordination in which William Demarest, Jr., served so capably as co-ordinator for several years. The success of the committee's efforts is evident now in the need for a more expansive and far-reaching organization to work with the many interested groups and individuals who seek to utilize modular dimensioning. For this reason, the MBSA was formed with major organizations in the building industry acting as sponsors. These include American Institute of Architects, The National Asssociation of Home Builders, The Associated General Contractors of America, and The Producers' Council, Inc.

MBSA's board of directors at its initial meeting on August 12 elected its first officers. Modular Evangelist Cyrus E. Silling, Architect, Charleston, W. Va., the present chairman of the American Standards Association's A-62 Committee for building standards, was chosen as president. Other officers elected include: Contractor James E. Coombs, Baker & Coombs, Inc., Morgantown, W. Va., first vice-president; Architect M. Edwin Green, Lawrie & Green, Harrisburg, Pa., second vice-president; H. Dorn Stewart, Armstrong Cork Company, Lancaster, Pa., secretary; and NAHB treasurer Martin Bartling, Knoxville, Tenn., treasurer.

Membership in MBSA is open to individuals, associations, manufacturers, and architectural, builder, or contractor organizations. Yearly dues have been established at $300 for sustaining members—principally manufacturers; $100 for contributing members—generally architectural, builder, or contractor firms; $25 for active individual memberships; and $10 for associate individual memberships. The latter, which is also open to students, has no voting privilege. The sponsoring organizations each have agreed to contribute $2000 annually for three years and will have the privilege of naming one director.

It is planned that a managing director will be employed as soon as practicable and will make his headquarters in ASA's New York office. During the organizational period, while a membership is being developed, staff functions will be handled by Welton A. Snow, AGC; Walter A. Taylor, AIA; Ralph Johnson, NAHB; as well as this writer, with the assistance of personnel from the respective organizations. As interest develops, local chapter organizations will be established to serve as educational centers and forums for the exchange of information.

People in the building industry who have actively supported modular dimensioning feel that the idea has proved sound and offers numerous advantages to those firms and individuals who utilize it in design, manufacture of products, and erection of buildings. The big problem now is to make modular dimensioning the rule rather than the exception in the industry. Active support of MBSA through membership will be a far-reaching step in this direction.

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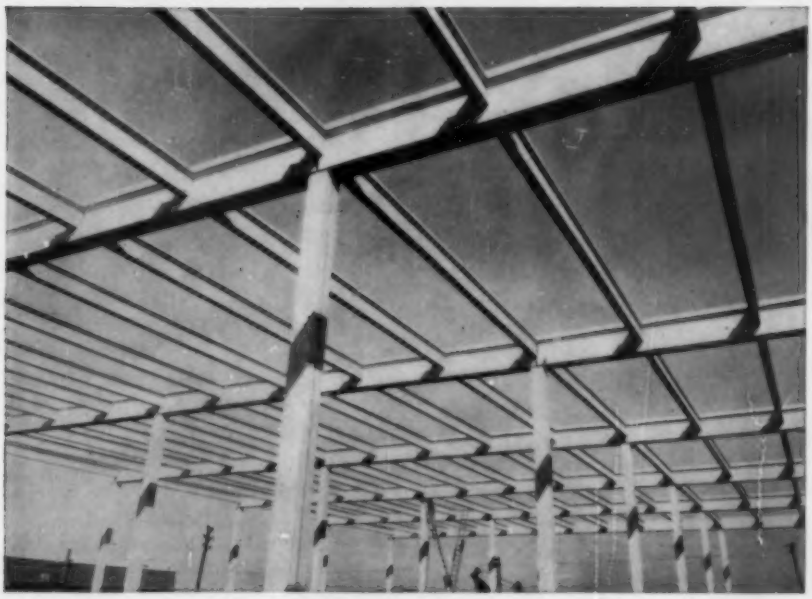

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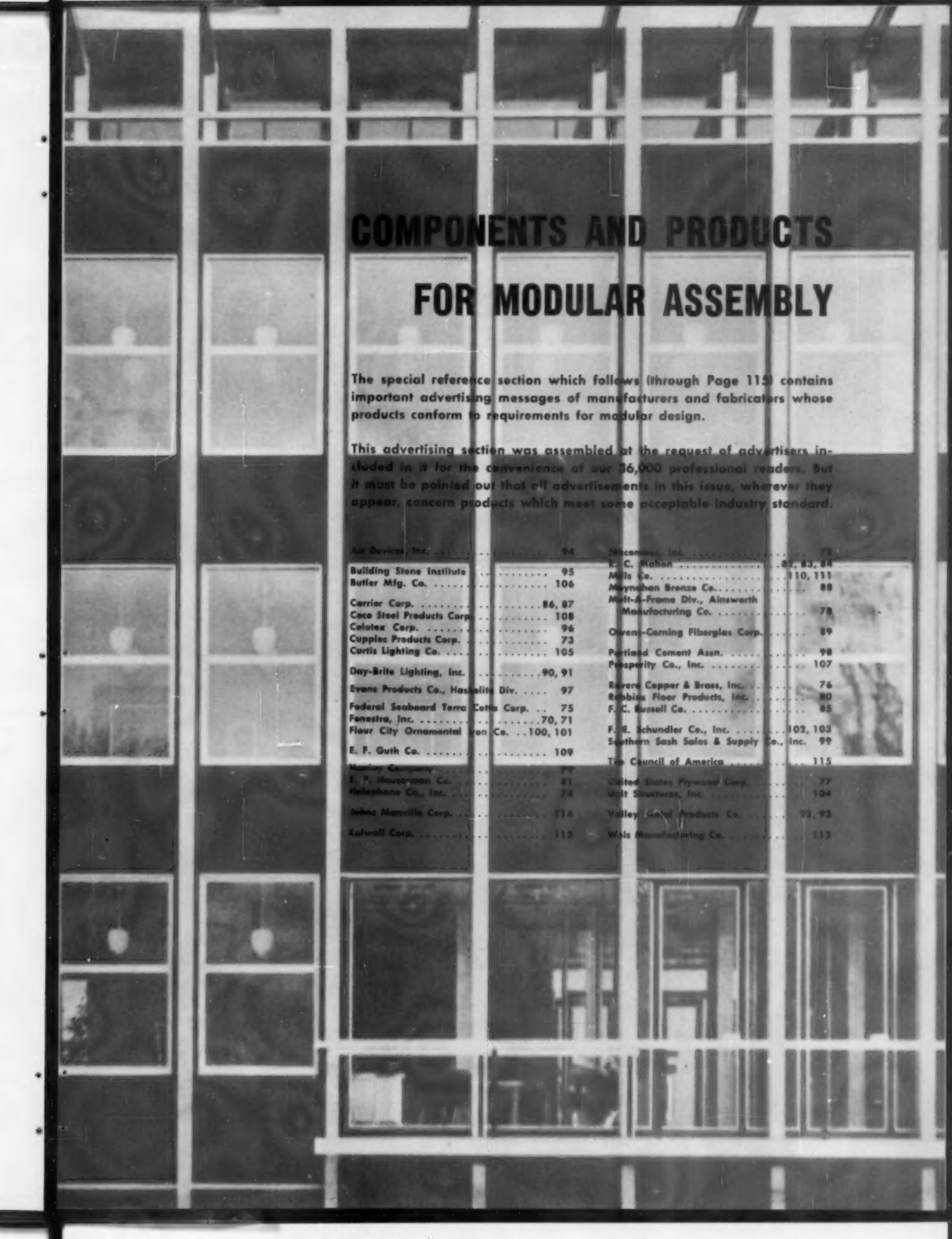
It so aptly describes KREOLITE FLEXIBLE STRIP End Grain Wood Block Flooring with its built-in cushioning resiliency.

Kreolite has other most wanted features that make it a better gym floor; Durable Beauty, Easy and Economical to install and maintain . . . it's safer too, because it's splinter-proof.

Liked by players and coaches and preferred by budget conscious school officials, Kreolite will prove to be the most satisfactory floor you ever specified. Write today for performance data and specifications. Take your first step to better floors for gyms, multi-purpose rooms or shops.

THE JENNISON-WRIGHT CORPORATION
TOLEDO 9, OHIO



COMPONENTS AND PRODUCTS FOR MODULAR ASSEMBLY

The special reference section which follows (through Page 115) contains important advertising messages of manufacturers and fabricators whose products conform to requirements for modular design.

This advertising section was assembled at the request of advertisers included in it for the convenience of our 36,000 professional readers. But it must be pointed out that all advertisements in this issue, wherever they appear, concern products which meet some acceptable industry standard.

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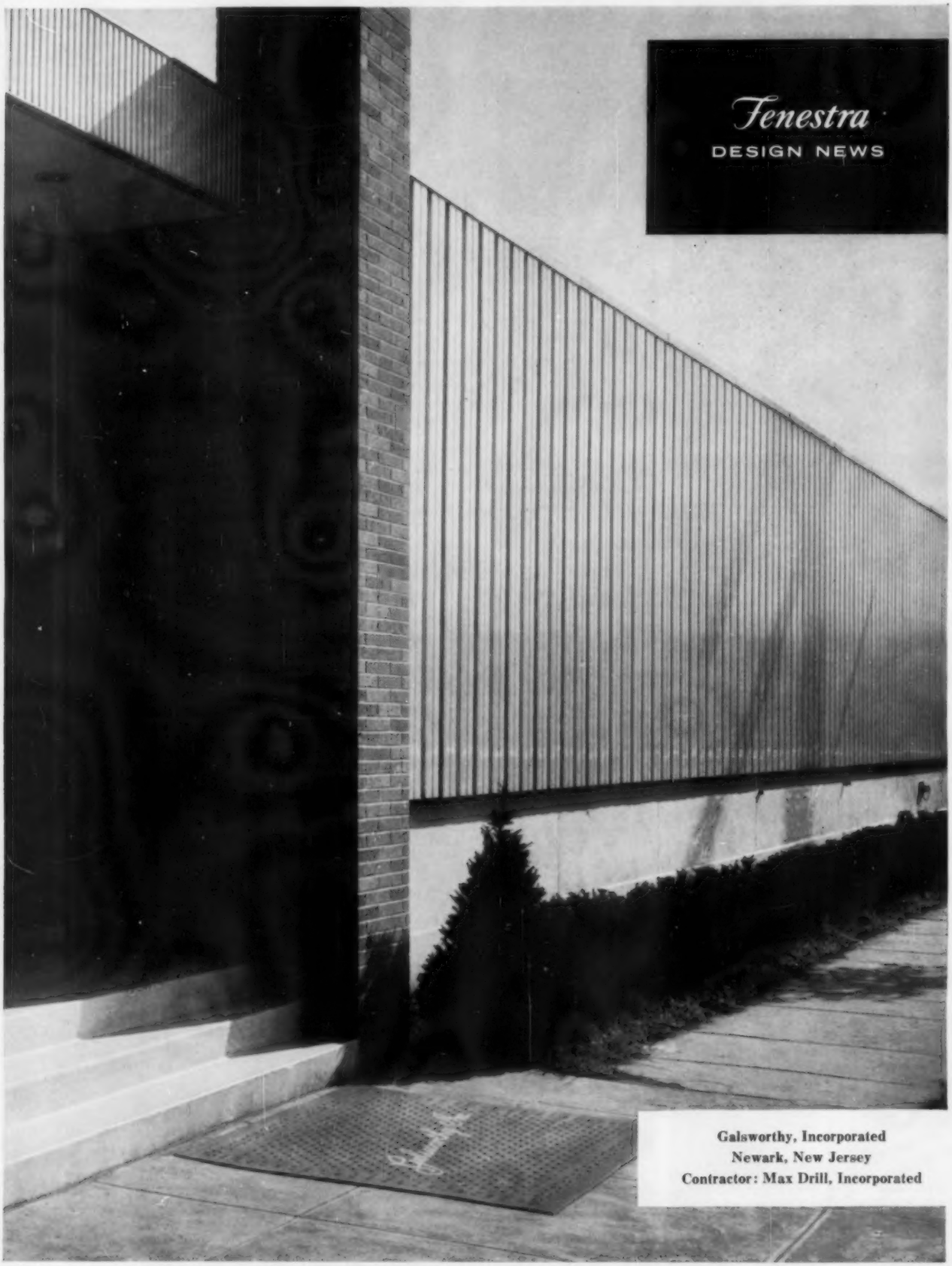
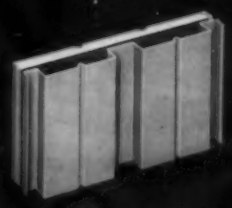
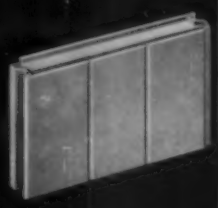


Galsworthy, Incorporated
Newark, New Jersey
Contractor: Max Drill, Incorporated



NEW Fenestra Type "FA" Wall Panel — Designed for simple, fast field assembly. Distinctive exterior design with deeply revealed fluting. Exterior — galvanized steel or grained aluminum (porcelain enamel optional). Interior — galvanized steel. Width 24". Lengths to 31'. Depth 3".



NEW Fenestra Type "C" Wall Panel — Smooth flush surface. Factory assembled. For use either horizontally or vertically in walls or partitions. Grained aluminum or galvanized steel. Width 24". Lengths to 14'. Depth 3".

NEW Fenestra Insulated Wall Panels*

CUT PLANT CONSTRUCTION COSTS!

To meet your demand for better looking, more efficient, lower cost wall panels for curtain wall construction, Fenestra introduces two new insulated metal wall panel products. Based on more than a quarter century of experience in the design and erection of this type of construction, these new Fenestra Insulated Metal Wall Panels give you many important advantages for industrial, commercial and other types of buildings.

Fast, easy erection—Lightweight, large area Fenestra Wall Panels are quickly attached by welding or bolting. Your buildings can be enclosed in days rather than weeks. This saves labor costs and gives the owner quick occupancy and a faster return on his investment. New Fenestra Type "FA" Panels are designed for field assembly for extra economy.

Distinctive appearance—New Fenestra Type "FA" and Type "C" Panels give the designer a choice of exterior appearance. The "FA" Panel provides a dramatic, deeply revealed fluted surface to create bold shadow lines that give distinctive beauty to any façade. The "C" Panel gives you a smooth flush surface and may be installed vertically or horizontally. Either panel is available in galvanized steel or a new grain-textured aluminum that hides scratch marks and reduces maintenance. There are also many exciting design possibilities in colorful field painting or in porcelain enamel finishes on aluminum.

High insulating value—Fenestra Metal Wall Panels provide insulating values better than a 16" masonry wall furred and plastered. U-factors range from .08 to .19 depending on panel type. Two-pound-density glass fiber insulation with excellent nonsettling properties is used. Since the panels are only 3" deep, this efficient insulation value means extra floor space for your buildings within the same foundation area.

Structural steel savings—Due to the lightweight construction possible with Fenestra Insulated Wall Panels, important savings are possible in the structural steel framework and foundation of your buildings.

Low-cost expansion—When the panels are attached by bolts, your building can be quickly expanded. The panels are removed, the addition erected and the panels reinstalled with minimum time and cost. Fenestra Wall Panels have been re-used as many as three times in plant expansion programs.

The New Fenestra Wall Panel catalog gives you complete details and design data on Fenestra Type "FA" and Type "C" Insulated Metal Wall Panels. Mail the coupon, below, for your FREE copy or call your local Fenestra representative—listed in the yellow pages.

*Trademark

Fenestra

INCORPORATED

INSULATED METAL WALL PANELS

Your Single Source of Supply for
BUILDING PANELS • DOORS • WINDOWS

Fenestra Incorporated
Dept. PA-11 3409 Griffin Street
Detroit 11, Michigan

Please send me FREE copy of New Fenestra Wall Panel Catalog.

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FIRM_____

ADDRESS_____

CITY_____ STATE_____

Why Don't You Let V-LOK Sell YOUR Next School Job?

POLLARD HIGH SCHOOL, NEEDHAM, MASS.
ARCHITECTS COLLABORATIVE, CAMBRIDGE

Acres Of Steel Framing Up and Being Roofed In And Not a Brick Has Been Laid

INTERLOCKING STRUCTURAL MEMBERS SPEED ERECTION

That's why V-LOK Steel Framing cuts construction time in half . . . 7 or 8 months instead of 12 or 14 months.

V-LOK reverses the old procedure of waiting months to lay up masonry walls and partitions so that a school can be roofed in and interior work started.

V-LOK with curtain walls designs into every need of the modern school and the Architect's structural requirements at a cost per square foot that warrants first consideration in every school district.

It only takes one V-LOK job and the savings in erection time to make a School Board and the tax payers in that district your friends for life. The V-LOK Design Manual will be a welcome addition to your files. Send for it.

MACOMBER

MACOMBER CANTON 1, OHIO

UNUSUAL DESIGN
AND USE OF COLOR

DISTINGUISH THIS
ALUMINUM CURTAIN WALL BY
CUPPLES

MEDICAL PROFESSIONAL BUILDING
Houston, Texas
Wirtz, Calhoun, Tungate & Jackson, Architects
Manhattan Construction Company, Contractor

Here is another excellent example of the many possibilities modern skin construction presents to architects and builders.

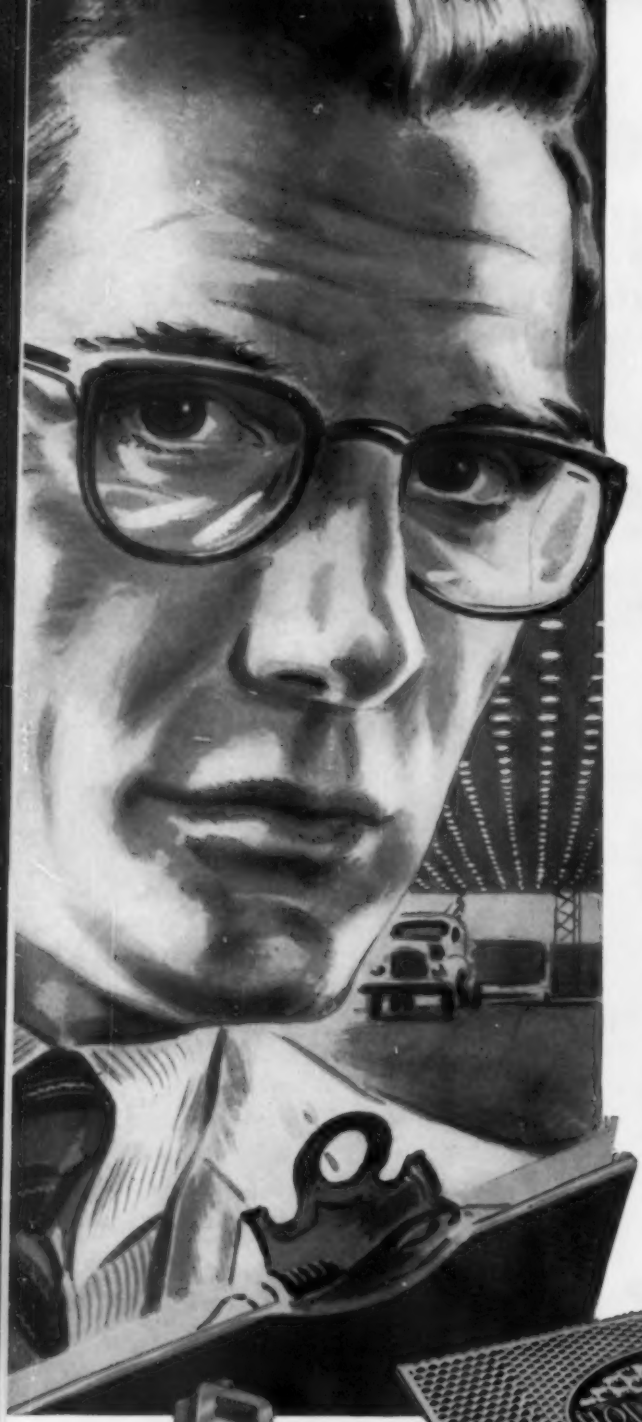
Large vertical mullions in garage area (lower four floors) are special extruded shapes in plain alumilite. Porcelain-on-aluminum panels inserted between these vertical mullions are in three colors. Extruded aluminum hand railing, door frames and gold alumilited wall facing on the ground floor, also by Cupples.

The office tower has 657 custom built vertical pivoted windows with panels in blue alumilite above and below each window. Pilaster panels are fluted gold alumilite. Belt course, coping, facia and louvers are plain alumilite.

Cupples is foremost in the design, fabrication and erection of aluminum curtain walls. Cupples is also one of the nation's largest manufacturers of aluminum windows, doors, ornamental products and Alumi-Coustic grid systems. Our catalogs are filed in Sweet's.

Cupples

PRODUCTS CORPORATION
2660 South Hanley Road • St. Louis 17, Missouri



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You want the Best Lenses

Prescribed for your Glasses...

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Custom-Engineered for your Lighting

Exact specification is the basis of an optical prescription... The same holds true in planning any form of lighting... Holophane's undeviating precision in manufacturing prismatic products for lighting just can't be duplicated by "rolling" methods. Every Holophane lens is individually PRESSED — one by one — on equipment specially built for the operation. It is only by this careful process that we can keep the prismatic patterns precise enough to *direct and control* the light with utmost accuracy. This craftsmanship makes the difference between *specification* and *approximation*... Holophane CONTROLENS*, Reflectors and Refractors are the vital components of *custom-engineered* lighting systems, scientifically designed for the specific purpose... They offer finest quality, consistently predictable performance, and low cost per unit in terms of light delivered.

To be sure of quality... look for the name Holophane impressed in each piece

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THE HOLOPHANE CO., LTD., 419 KIPLING AVE. SO., TORONTO 14, ONTARIO

For Better Lighting Holophane ... *Be Specific*

How Ceramic Veneer helps you achieve the unusual

Creative expression which combines color and form to define character and serve function is never restricted when Ceramic Veneer enters your plans. This modern architectural terra cotta matches the imagination in versatility. For plain surfaces, polychrome panels or sculpture, it offers an unrivaled range of colors and textures. Every unit large or small for exteriors or interiors is custom-made by Federal Seaboard craftsmen to your precise specifications. Ceramic Veneer assures lighter-weight walls, economical installation, quality, appearance, permanence and ease of maintenance. Moreover, because of its versatility, Ceramic Veneer can be combined impressively with other building materials. Without charge we will gladly furnish construction detail, data, color samples, and advice on preliminary sketches involving use of Ceramic Veneer.

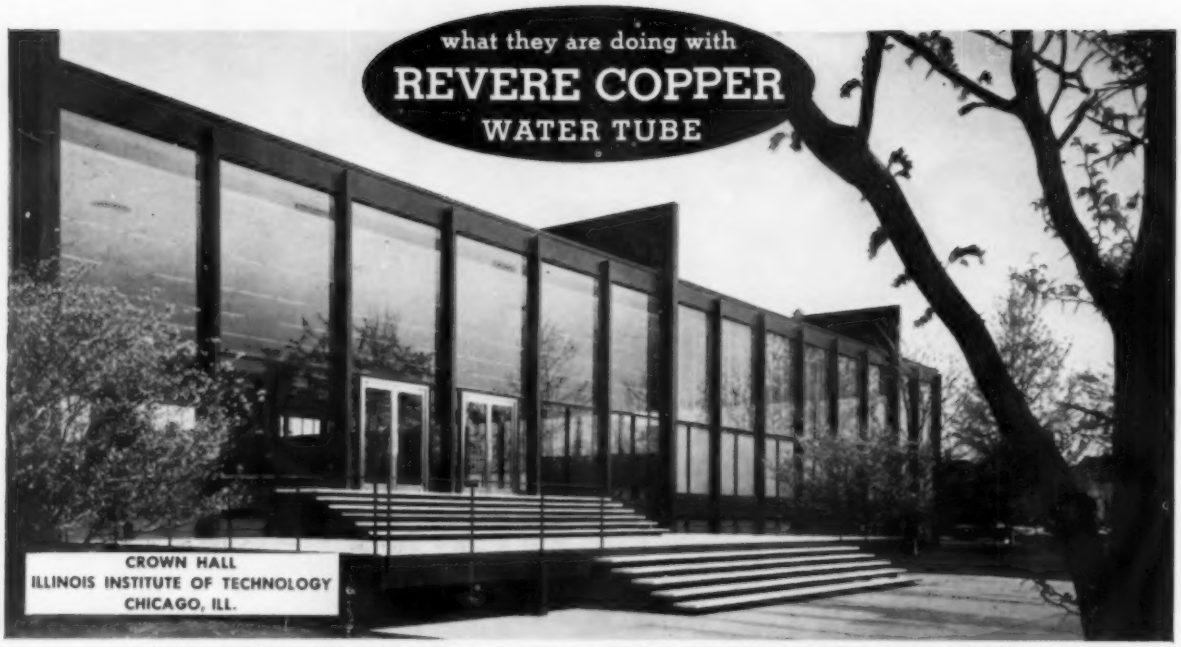
IMMACULATA JUNIOR COLLEGE AND SEMINARY
WASHINGTON, D. C.

Murphy and Locraft — *Architects*
John Tester and Son, Inc. — *Builder*

Eight colors including blue-green, cream, buff, green and maroon were specified in hand-made Ceramic Veneer. Typical unit sizes are 8" x 8", 8" x 24", 12" x 12".

F S T C

FEDERAL SEABOARD TERRA COTTA CORPORATION
10 East 40th Street, New York 16, N. Y. • Plant at Perth Amboy, N. J.



Architect: MIES VAN DER ROHE. *Associate Architect-Engineer:* PACE ASSOCIATES. *Structural Engineer:* FRANK J. KORNACKER. *General Contractor:* DAHL-STEDMAN COMPANY. *Landscape Architect:* ALFRED CALDWELL, all of Chicago.

UNIQUE SPLIT SYSTEM meets air change requirements and at the same time gives occupants the many benefits of RADIANT PANEL HEATING

In this split system, ventilation ducts in the ceiling provide the necessary air changes per hour as required by the Chicago Building Code. In the winter the air is heated, supplemented by the radiant panel system in the floor. The warm air system carries the principal heat loss while the radiant panel system offsets the heat loss of the large glass areas.

Revere Copper Water Tube was used for radiant heating panels because the standard 60′ lengths mean fewer fittings, the sure soldering of copper means tight joints and its non-rusting qualities mean no clogging or reduction of flow. In addition, contractors are finding out that when properly applied, copper water tube not only is dependable and easier to work, but actually *costs less* than rustable materials.

The inherent qualities of Revere Copper Water Tube also make it the first choice for hot and cold water lines, underground service lines, processing lines, drainage and waste lines, vent stacks. See your Revere distributor for your needs.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.
Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Neuport, Ark.; Ft. Calhoun, Neb. Sales offices in Principal Cities. Distributors Everywhere.

COPPER * BRASS * 18 01 * REVERE * ALUMINUM *

13,580 FEET OF TYPE "L" Revere Copper Water Tube were supplied the Heating Contractor, CHICAGO CONDITIONAIRE COMPANY by the Revere Distributor, COLUMBIA PIPE & SUPPLY CO., both of Chicago.

AN IDEAL HEATING COMBINATION—Air ducts in the ceiling and radiant panel heating coils in the floor. Note that, due to greater heat loss, panels near the windows are spaced on 12" centers, while the remainder are on 24" centers.

Shown: Walnut Weldwood Paneling, Connecticut Mutual Life Insurance Company, Hartford, Conn. Designer: Peter Fraser, Jr.

Now—3 kinds of Weldwood Paneling let you offer interiors with one-of-a-kind real wood beauty

Office walls "talk" about their owners all day long. You can be sure they say unique, meaningful things when they're paneled with Weldwood real wood paneling. From rich-grained, glowing Walnut (above) to cheerful, modern-as-today Birch, Weldwood Paneling gives a room distinctive, handsome warmth.

Real wood is easy to keep beautiful—needs only occasional waxing. A satisfied client is good reason to suggest Weldwood real wood paneling, partitions, or Flexwood. See a complete Weldwood Paneling display at any of our 87 branches in principal cities. New York Showroom: 55 W. 44th St., N.Y. 36, N.Y.

FREE WELDWOOD BOOKLET, "Functional Beauty for Business and Institutional Interiors." Write for your copy. We will be glad to have a Weldwood Architects' Service Representative consult with you—no obligation. United States Plywood Corporation, Dept. PA11-57, 55 W. 44th St., New York 36, N. Y.

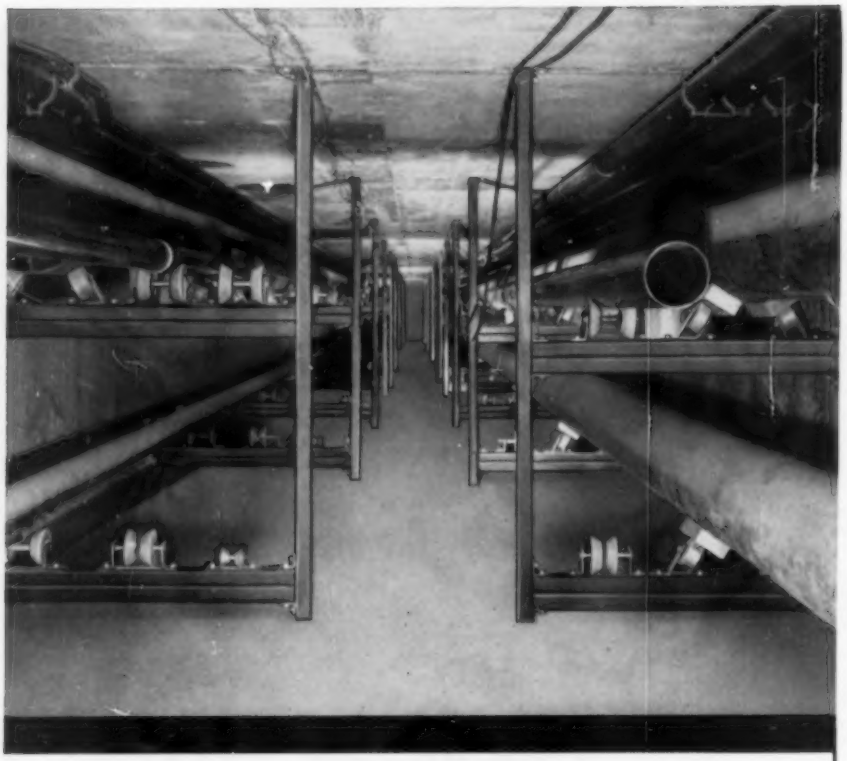
Weldwood®

Paneling • Flexwood • Partitions

UNITED STATES PLYWOOD CORPORATION

WELDWOOD MOVABLE PARTITIONS give you beauty of real wood paneling yet enable you to change office layout overnight. Mineral core stills noise. Shown: Korina® Weldwood Partitions, Ford Motor Company's Staff Building, Dearborn, Mich. Architects: Skidmore, Owings & Merrill, N. Y.

WELDWOOD FLEXWOOD®—wood veneer on cloth backing—is quickly installed on any hard, smooth surface—flat or curved. In more than 40 woods. Shown: budget-priced Random Grade Birch in Conference Room, Veterans Administration, Washington D.C. Black Kalistron® covers the doors.



New 1-inch channel helps cut tunnel construction cost

Mult-A-Frame It!

New MULT-A-FRAME concrete inserts now are making tunnel construction easier and faster than ever before. Here's why: MULT-A-FRAME is now available in one-inch depths, i. e. reinforced concrete thicknesses.

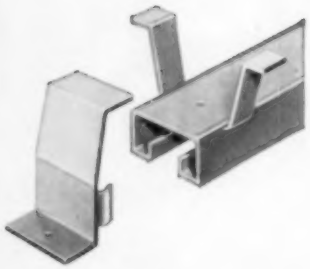
So here's all you do. Just nail the new, one-inch MULT-A-FRAME insert channel to the outer form; lay reinforcing rods on anchors at 12-inch marked intervals; wire the vertical rods and you're ready to pour concrete. When forms are removed, MULT-A-FRAME is secured flush with concrete, ready to hold pipe or cable supports.

For more information about how new MULT-A-FRAME concrete insert channel can save you time and money in your tunnel construction work: send today for your free copy of the 1957 MULT-A-FRAME catalog which illustrates an almost limitless variety of cost-saving MULT-A-FRAME applications in the plumbing and heating fields. Or, if you wish, call your nearby MULT-A-FRAME distributor.

A 4-P-4

MULT-A-FRAME
AINSWORTH DETROIT, U.S.A.

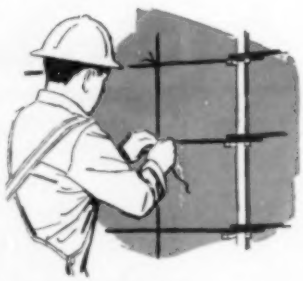
MULT-A-FRAME DIVISION
Ainsworth Manufacturing Corporation
1473 E. Atwater Street, Detroit 7, Mich.



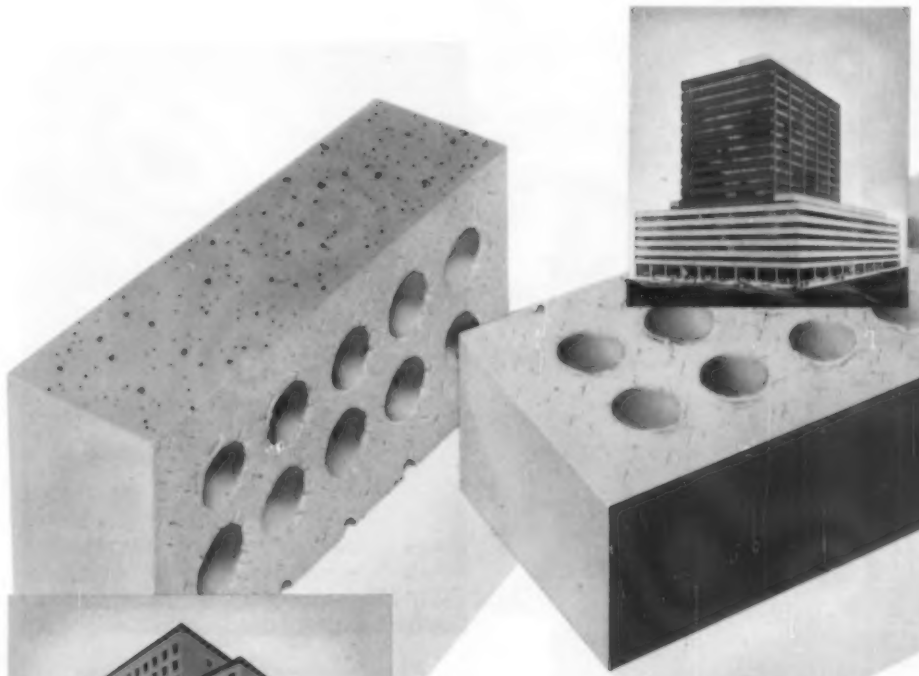
1 New concrete insert channel is 1-inch in depth providing clearance for reinforced concrete applications.

2 Nail channel (slot to inside of tunnel) against concrete form.

3 Channel anchors are at 12" increments allowing automatic spacing of horizontal reinforcing rods.

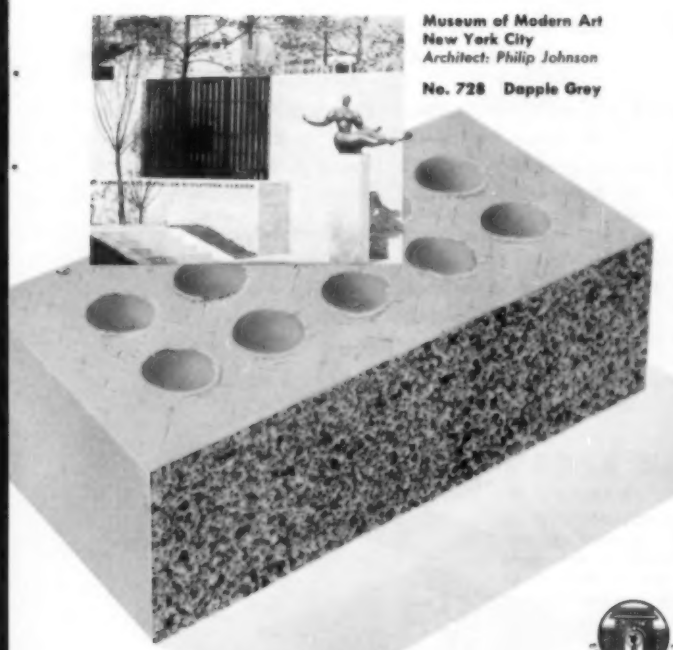


4 Tie vertical reinforcing rods in place and you're ready to pour.



711 Third Avenue Building
New York City
Architect: William Lescaze
No. 418 Iris Blue

Elmhurst General Hospital
Queens, Long Island, N.Y.
Architect: York & Sawyer
Dept. of Public Works, N.Y.C.
No. 735 Coral Pink, medium speck



Museum of Modern Art
New York City
Architect: Philip Johnson
No. 728 Dapple Grey

HANLEY

BRICK

NUANCES of color offered by HANLEY DURAMIC BRICK make it the ultimate building material—strong, enduring, culminated by lasting beauty. Shown are three popular HANLEY DURAMIC colors, each subtle, each lending architectural distinction to artistic yet functional design.

HANLEY DURAMIC beauty and quality make it the choice of the nation's foremost architects and builders.

For further information and technical literature, write or phone your nearest HANLEY office or distributor.

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Robbins
POMPEIIAN
vinyl

makes an unbeatable bid for the luxury flooring contract

BEFORE: An elevator foyer in New York's Hotel Navarro, before remodeling. Heavily-trafficked areas like this serve the hotel's luxury suites.

When you move an elegant floor covering, you reap an elegant profit! It's that simple. In the case of Robbins Pompeiian, the sales potential is terrific. Appearance . . . durability . . . maintenance . . . cost — Pompeiian sells itself on all four levels.

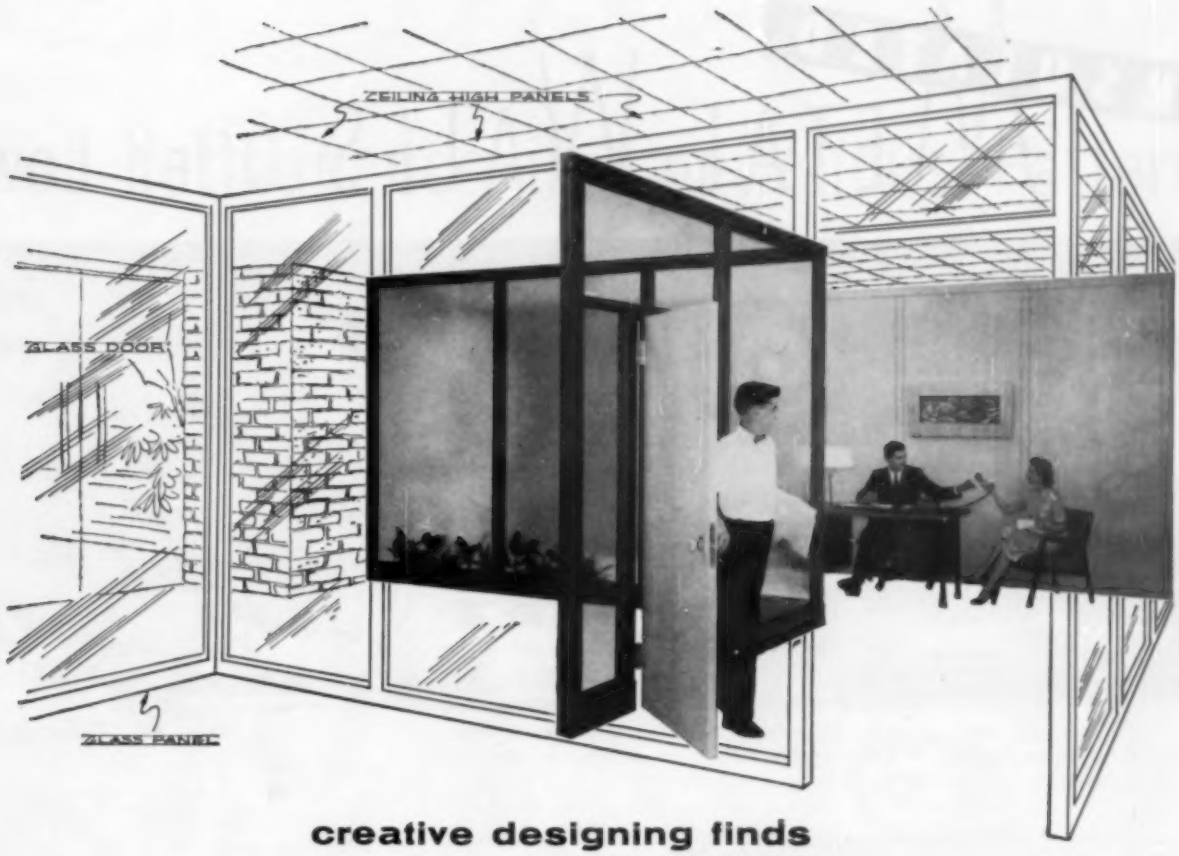
Take the installation in the photo, above right, for example. The total cost — including the elaborate brasswork — was only slightly higher than that of good quality carpeting. It was only *half* the cost of the thinnest usable marble flooring. Carpeting, of course, would have had to be replaced periodically. Marble would have severely limited the decorator's design.

These same considerations will turn your customers to Pompeiian and the whole family of Robbins originals whenever quality and luxury are uppermost in their minds. Be ready to take advantage of these powerful sales-stimulants.

AFTER: An identical foyer, redecorated with inlaid flooring of Robbins Pompeiian vinyl tile . . . by the famous hotel designer, Henry End, A.I.D., A.I.A.

fabulous
floors
by

Robbins
FLOOR PRODUCTS, INC.
Tuscumbia, Alabama



creative designing finds practical applications in

MOVABLE Hauserman INTERIOR WALLS

Now, through the use of Movable HAUSERMAN Interior Walls, your most exciting design ideas find practical expression. HAUSERMAN full-light glass panels, combined with boldly colored HAUSERMAN Walls, for example, create an interior spaciousness that complements perfectly the appealing "open feeling" of window-wall construction. And your client will find that the movability feature of HAUSERMAN Walls enables him to keep his office interior as efficient as it is attractive.

HAUSERMAN, as the interior subcontractor, saves you valuable time, too. To cut your drafting room time, Hauserman provides detailed working drawings. On the job, the need for coordinating the activities of several trades is eliminated. Write today for details.

MOVABLE HAUSERMAN INTERIORS

National Lifetime Service . . . An Exclusive Hauserman Dividend

THE E. F. HAUSERMAN COMPANY
7506 Grant Avenue, Cleveland 5, Ohio
Hauserman of Canada Ltd.
91 Yonge St., Toronto, Ontario

Please send your new Data Manual 57 covering complete HAUSERMAN technical details to:

Name _____

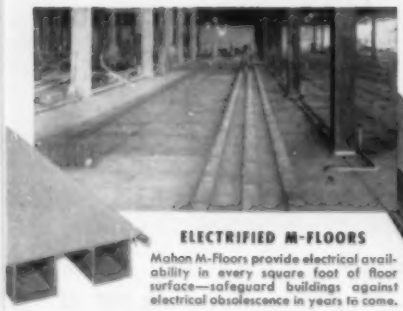
Company _____ Title _____

Street _____

City _____ Zone _____ State _____

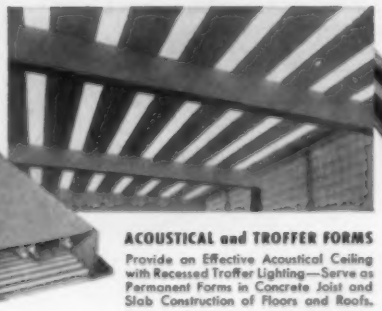
INSULATED METAL WALLS Offer Low-

Top: Body Engineering and Research Building, Ford Research and Engineering Center, Dearborn, Mich. Voorheis, Walker, Smith & Smith, Architects. Bryant & Detwiler Co., General Contractors. Center: New Plant for Leeds & Northrup Co., North Wales, Pa. L. Rossetti, Architect. Giffels & Vallet, Inc., Consulting Engineers. Baton Construction Corp., Gen. Contrs. Bottom: New Plant for Ditto, Inc., Lincolnwood, Ill. Battey & Childs, Archts. Charles B. Johnson & Sons, Inc., Gen. Contrs.



ELECTRIFIED M-FLOORS

Mahon M-Floors provide electrical availability in every square foot of floor surface—safeguard buildings against electrical obsolescence in years to come.



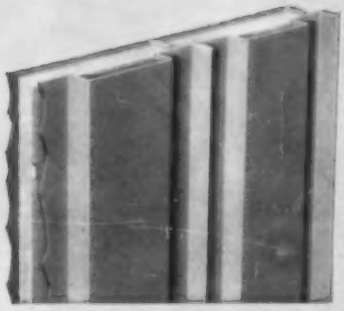
ACOUSTICAL and TROFFER FORMS

Provide an Effective Acoustical Ceiling with Recessed Troffer Lighting—Serve as Permanent Forms in Concrete Joist and Slab Construction of Floors and Roofs.

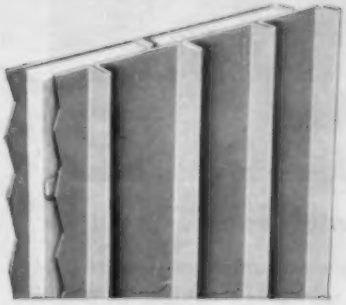
CONCRETE FLOOR FORMS

Mahon Permanent Concrete Floor Forms in various types meet virtually any requirement in concrete floor slab construction over structural steel framing.

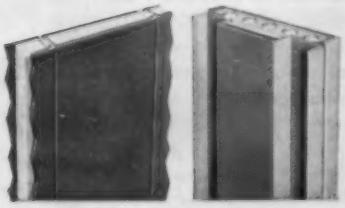
Cost Permanence in Continuous Patterns that Produce Attractive Exteriors!



MAHON FLUTED WALL
FIELD CONSTRUCTED



MAHON RIBBED WALL
FIELD CONSTRUCTED



FLUSH FLUTED
MAHON PREFAB WALL PANELS

Almost everywhere you look in America today, you will see new, modern buildings with bright metal exteriors which give them a neat, clean-cut appearance—a certain look of trimness and distinction that sets them apart from the conventional . . . these are truly modern buildings constructed with permanent, light weight, stainless steel or aluminum curtain walls.

Some of the country's outstanding architects have employed Mahon Insulated Metal Curtain walls skillfully and to good advantage, costwise, in producing striking exterior design effects in office buildings, schools, armories, military barracks, sports arenas, parking garages, warehouses, industrial buildings of all types—including powerhouses, and some important monumental buildings. The engineering-research building and the two industrial plants illustrated at the left are typical examples.

Metal Curtain Walls with exterior plates of embossed or colored aluminum, stainless steel, or cold rolled steel painted, employed in combination with brick, ornamental stone, glass block or other materials offer unlimited possibilities in architectural treatment of exterior design. Bright metal, or colored metal, provides the designer with the means of individualising and creating distinctiveness in almost any type of building.

In Mahon Insulated Metal Walls, vertical joints are invisible—symmetry of pattern is uninterrupted across the wall surface . . . and, the field constructed walls can be erected up to sixty feet in height without a horizontal joint. These two design features, which are extremely important from an appearance standpoint, were engineered into Mahon Insulated Metal Curtain Walls to give you a finer appearing wall surface with a continuous pattern free from unsightly joints.

You'll want to investigate these Mahon "better look" features before you select a metal curtain wall for any building.

See Sweet's Files for information, or write for Catalogue W-57.

THE R. C. MAHON COMPANY • Detroit 34, Michigan
Sales-Engineering Offices in Detroit, New York and Chicago
Representatives in all Principal Cities

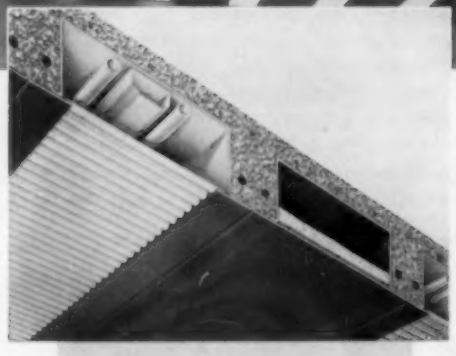
M A H O N

STEEL ROOF DECKS
Standard Double Rib, Wide-Flange Double Rib, and Long Span M-Decks, which can be furnished with perforated surface and fitted to provide an efficient acoustical ceiling.

UNDERWRITERS' RATED FIRE WALLS
Mahon Metalclad Fire Walls carry two Hour Rating by Underwriters' Laboratories, Inc., for Use as Either an Interior Dividing Fire Wall or an Exterior Curtain-Type Fire Wall.

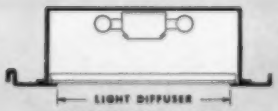
ROLLING STEEL DOORS
Standard Manually, Mechanically or Power Operated Rolling Steel Doors and Grilles. Underwriters' Labeled Automatic Closing Rolling Steel Fire Doors and Fire Shutters.

ACOUSTICAL and TROFFER FORMS



MAHON
ACOUSTICAL and TROFFER FORMS

SECTION M1A (Acoustical)



SECTION M1T (Troffer)

. . . for Acoustical Ceilings with Recessed Lighting!

Mahon Acoustical and Troffer Forms provide an effective acoustical ceiling and recessed lighting as well as serving as the permanent forms for concrete joist and slab construction of floors and roofs. These are long span units which are integrated with and supported by conventional concrete beams at each end. Only a minimum of temporary shoring is required at mid-span during pouring and curing of concrete. This is permanent, fireproof construction which has a broad application in modern buildings . . . it is used extensively for auditoriums, school classrooms, and in other rooms where an acoustical ceiling with recessed lighting is desirable. Mahon Troffer Sections are also available for use with Mahon M-Deck Sections to provide a combined roof and acoustical ceiling with recessed lighting. In this arrangement the long span M-Deck serves as the structural unit, the interior finish material and the acoustical treatment—all in one package. Purlins are eliminated . . . M-Deck Sections span from wall-to-wall or from truss-to-truss. Some of these Mahon Forms and Structural Sections do not appear in the current Sweet's Files. Why not have a Mahon sales engineer call and bring you up to date on Mahon products now available for Floor, Roof and Ceiling Construction?

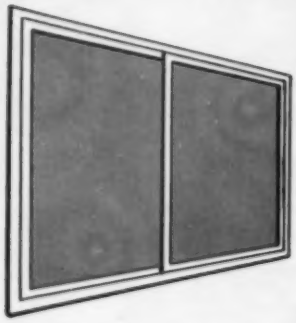
THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Office in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Acoustical and Troffer Ceiling Forms; Steel Roof Deck and Long Span Acoustica M-Decks; Electrified M-Floors; Insulated Metal Curtain Wall; Rolling Steel Doors, Grilles, and Underwriters' Labeled Automatic Rolling Steel Fire Doors and Fire Shutters; and Underwriters' Rated Fire Walls.

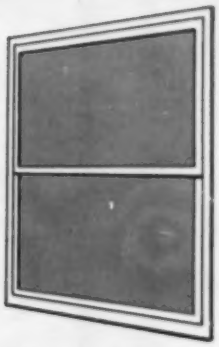
Above is the Ceiling of the Auditorium in the Eugenia Mettetal School, Detroit, Michigan. It is one of 50 rooms with Mahon Acoustical-Troffer Ceilings. Shreve, Walker & Associates, Inc. Architects. Alfred A. Smith, Inc., Gen. Contractors.

MAHON



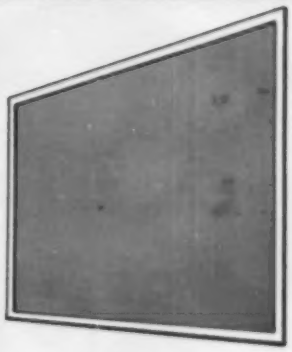
Horizontal Slide Windows

Standard unit features one fixed lite and one sliding panel with either left or right hand operation. Composite unit has sliding panels at both ends of fixed center lite.



Vertical Slide Windows

Have fixed upper panel and movable lower panel, latch pin operated. Units are easy to combine in twin or multiple combinations. Available with single lite or double lite panels.



Picture or Fixed Lite Windows

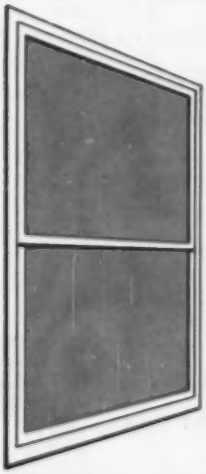
Maximum glazing economy where ventilation is not required. Combines with all Rusco ventilating windows for wide variety of designs. Available in 1-2-3 lite units.

More styles to choose from with Rusco Modular SIZED Windows

Take your choice of styles when you specify Rusco modular-sized windows. Rusco's complete line of steel and aluminum prime windows is now available in approved modular sizes at volume prices. All are engineered to permit interchangeable vertical stacking and mullioning to produce almost unlimited design combinations. Used singly or stacked vertically, and/or mulled together, Rusco windows meet every fenestration requirement. All openings, regardless of types and arrangements, retain modular dimensions.

Rusco windows provide complete flexibility and economy. Advanced design makes possible a large number of arrangements to fit the same opening size. Building costs are cut, too. Rusco windows are completely glazed, packaged units you install in minutes. Fiberglas-screened, all hardware attached. Movable panels slide on felt. Can't stick or rattle. Built-in weatherstripping. Optional features: snap-in interior casings, nailing fins, double glazing. Write for catalog. The F. C. Russell Co., Dept. 7-PA-117, Cleveland 1, Ohio. In Canada: Toronto 13, Ontario.

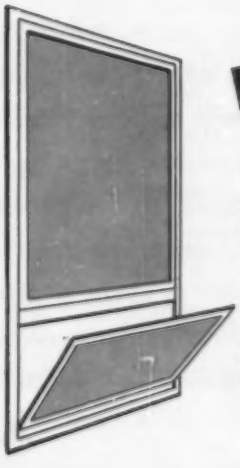
RUSCO *the window that brought a new look to building*



NEW!

Vertical Balanced Windows

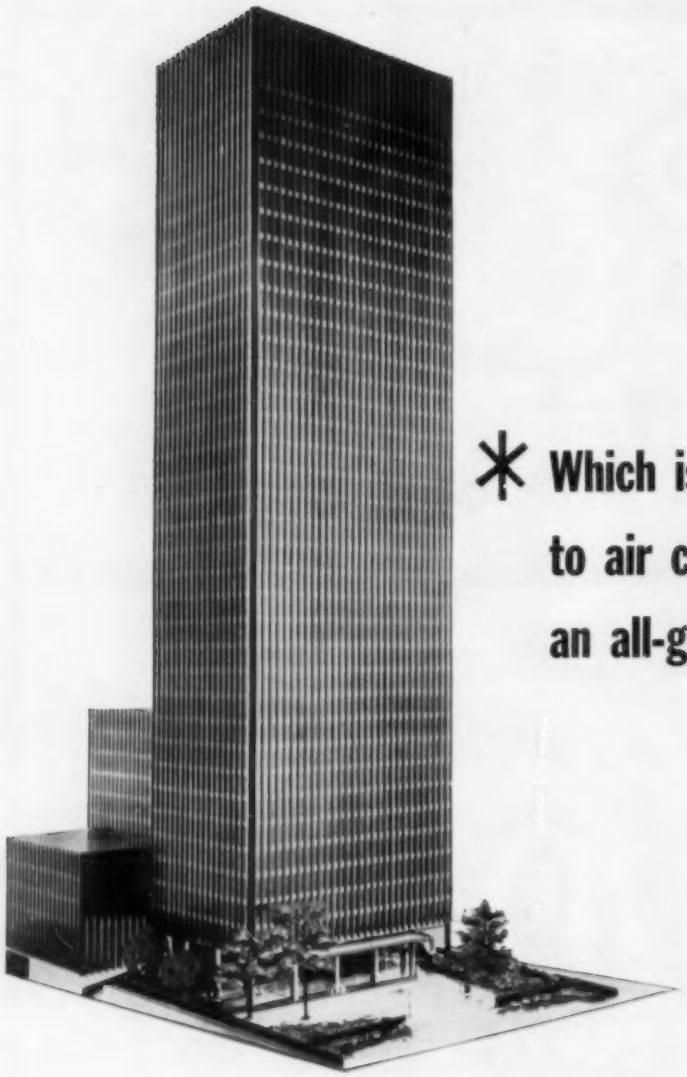
Two movable sashes. Bottom sash spring balanced for opening in any position. Fingertip control. Top sash latch pin operated for venting in predetermined positions. Combines with other Rusco windows.



NEW!

Hopper Vent Windows

Have adjustable sliding friction shoes and pivot arms to permit opening in any position. Pivot arms completely concealed when vent is closed. A cam actuating handle and keeper snugs vent tight and secure. Combines with other Rusco windows.



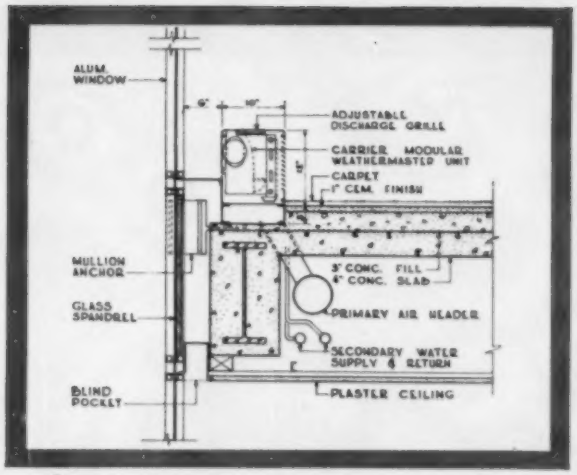
✳ Which is the best way to air condition an all-glass building?

That depends on the building. For example, its fenestration and construction are important factors in selecting individual air conditioning units. Carrier meets every variation of these factors with its flexible new Modular Weathermaster* Units. Based on the "building block" principle, they adapt attractively and efficiently to all conditions, provide individual climate control in each room. Only Carrier makes modular units to fit any all-glass building problem. Here are six different modular arrangements—there are many more. For complete information about them, call your nearest Carrier office.

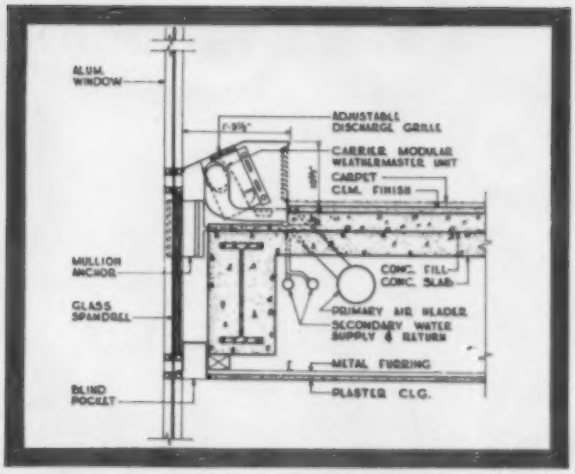
Carrier

*Reg. U.S. Pat. Off.

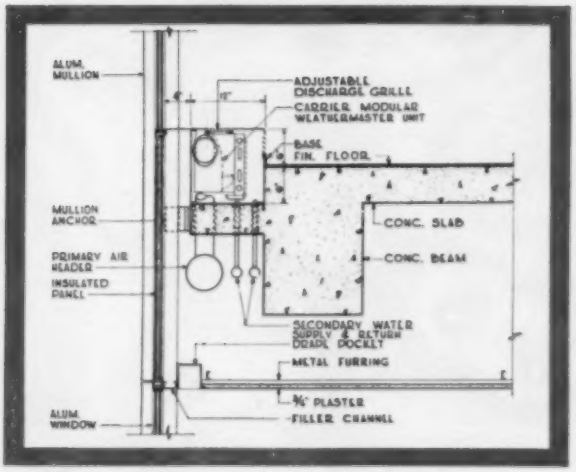
For free booklet describing Carrier Modular Weathermaster Units, ask your nearest Carrier office for 36N-64. Or write Carrier Corporation, Syracuse, New York.



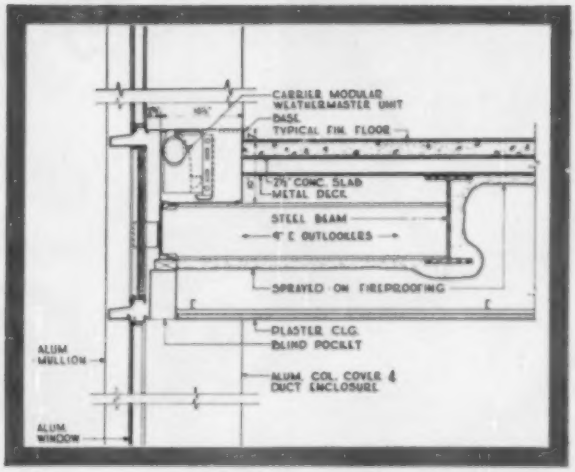
✱ TYPICAL INSTALLATION WITH STOOL POCKET



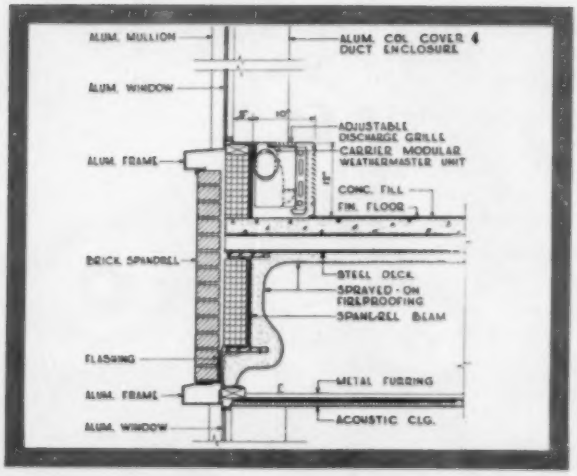
✱ TYPICAL INSTALLATION WITH SLOPING STOOL



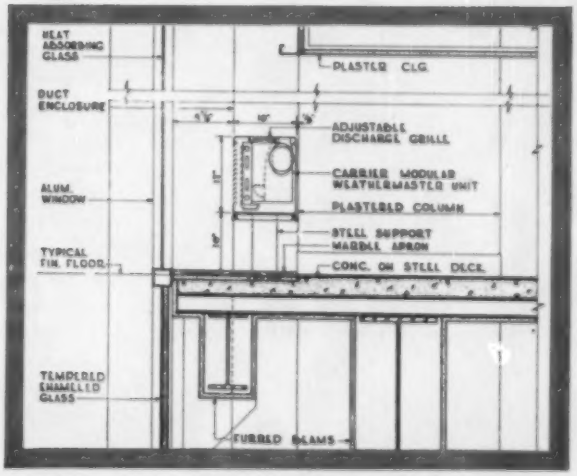
✱ TYPICAL SEMI-RECESSED INSTALLATION



✱ TYPICAL RECESSED INSTALLATION



✱ TYPICAL SURFACE INSTALLATION

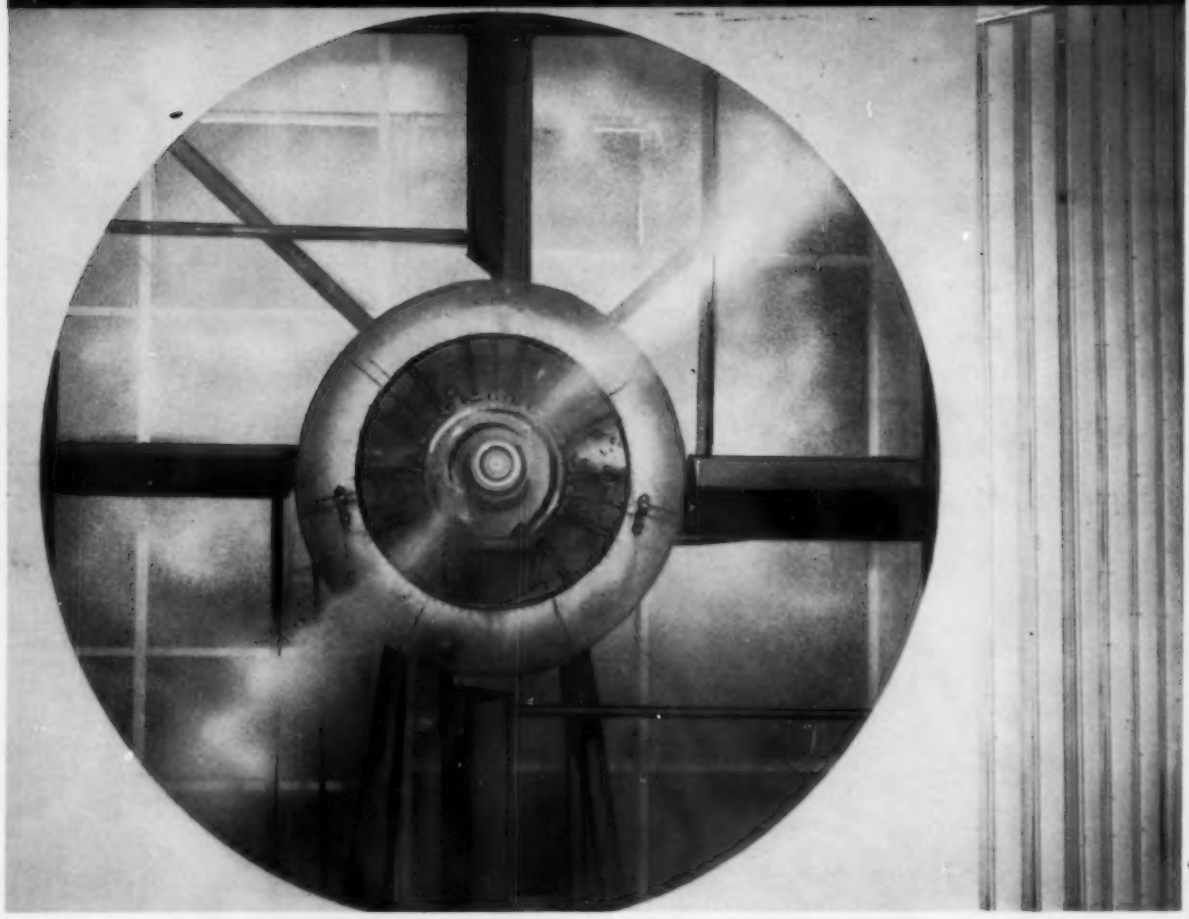


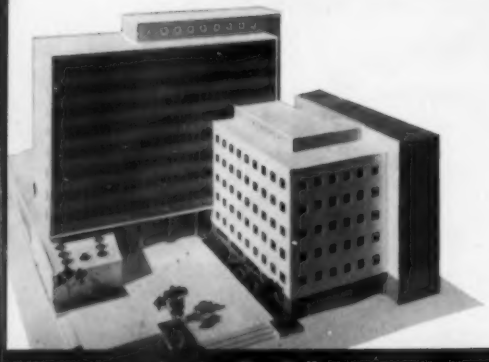
✱ TYPICAL RAISED INSTALLATION

Air and water services to individual Carrier Modular Weathermaster Units may be run horizontally from vertical risers, or they can be fed vertically from sources running horizontally in the ceiling below.

MOYNAHAN ALUMINUM CURTAIN WALLS

defy water lashed by 135 miles per hour winds





Lansing City Hall
Architects: Black & Black

Ford Central Staff Office Bldg.

This battering, blasting test involves average production walls of aluminum and glass, twenty-eight feet wide by fifteen feet high, assembled in the ordinary manner. Such tests prove conclusively that Moynahan Curtain Walls will take nature's beating without air or water infiltration.

Moynahan Aluminum Curtain Walls' strength is achieved without steel coring . . . without losing their trim, smart appearance. Series AW has no exposed screws. Stainless steel springs apply constant pressure against Neoprene gasketing, make glass and spandral panels weatherproof units.

Moynahan Aluminum Curtain Walls, available in series AW and AW-F, can be supplied in custom or modular components including, if desired, aluminum entrances, operating windows, and louvers.

All Moynahan Aluminum Curtain Walls and component parts are guaranteed to meet or surpass the most rigid building standards.

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IN SWEET'S ARCHITECTURAL FILE
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A fire-safe **Fiberglas ceiling covers you with greater safety!**

Fiberglas* Ceiling Boards are noncombustible and rated fire-safe. You may save on insurance costs over other types of ceilings, and in many other ways. Dry Fiberglas Ceiling Boards go up three times faster than ordinary ceilings—in any weather! No waiting, no mess—get the use of your building faster!

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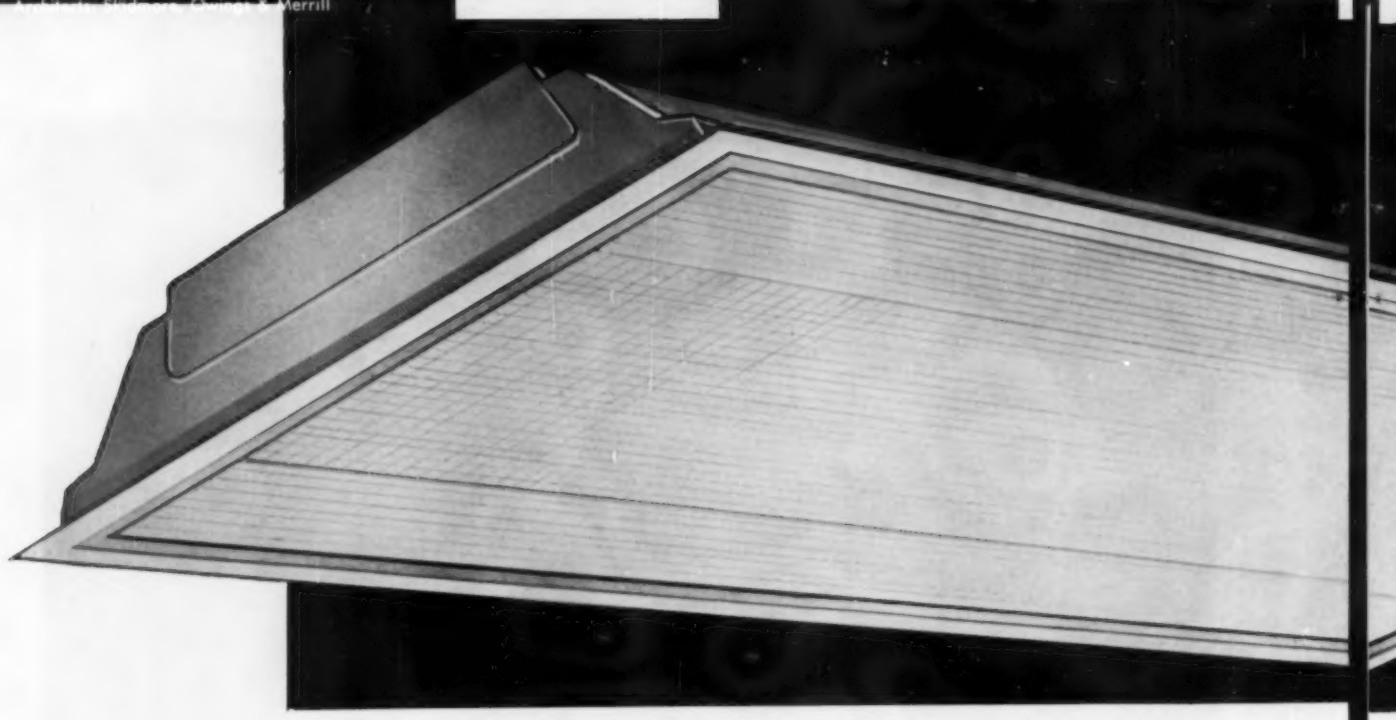
- **Lower heating and cooling costs**—with extra-high insulation value that can cut heating and cooling costs.
- **Access above ceilings**—just lift the board out of its supporting grid. Ideal for electrical servicing, speedy remodeling.
- **Integrated flexible lighting**—with specially-designed low-cost lighting systems of many types.
- **Beauty**—with choice of textured, striated, or colored plastic film finishes and complete range of modular sizes.

Your Fiberglas Ceiling Contractor will help you pick the right Fiberglas ceiling for your needs. Or write direct to Owens-Corning Fiberglas Corporation, Dept. 63-K, Toledo, Ohio.

OWENS-CORNING
FIBERGLAS

47-M (Reg. U.S. Pat. Off.) O-C.F. Corp.



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FOR MODULAR ASSEMBLY

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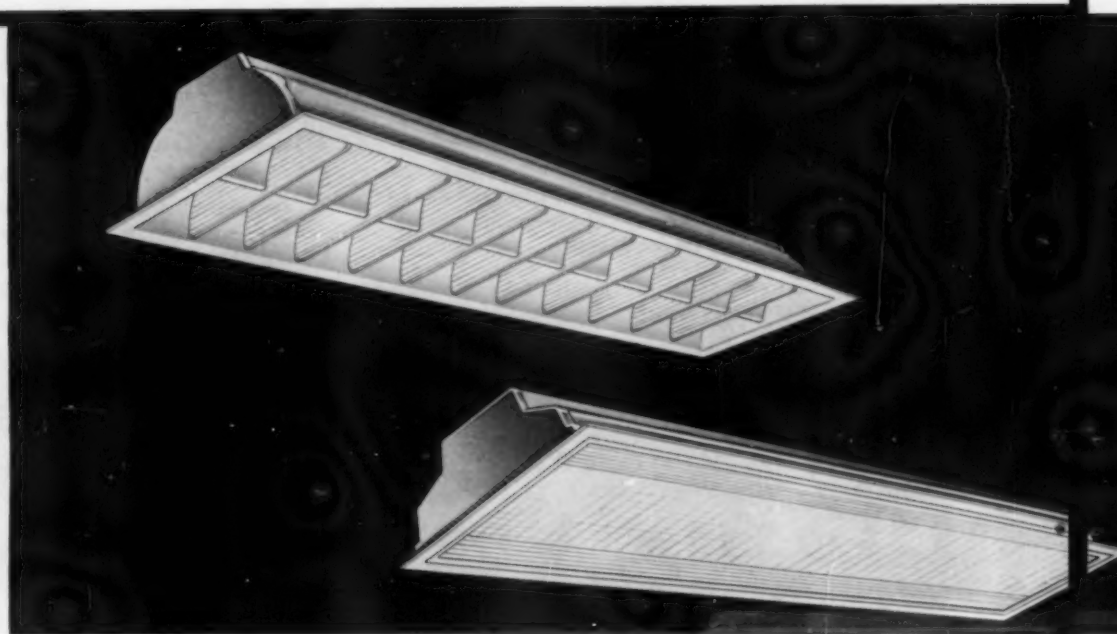
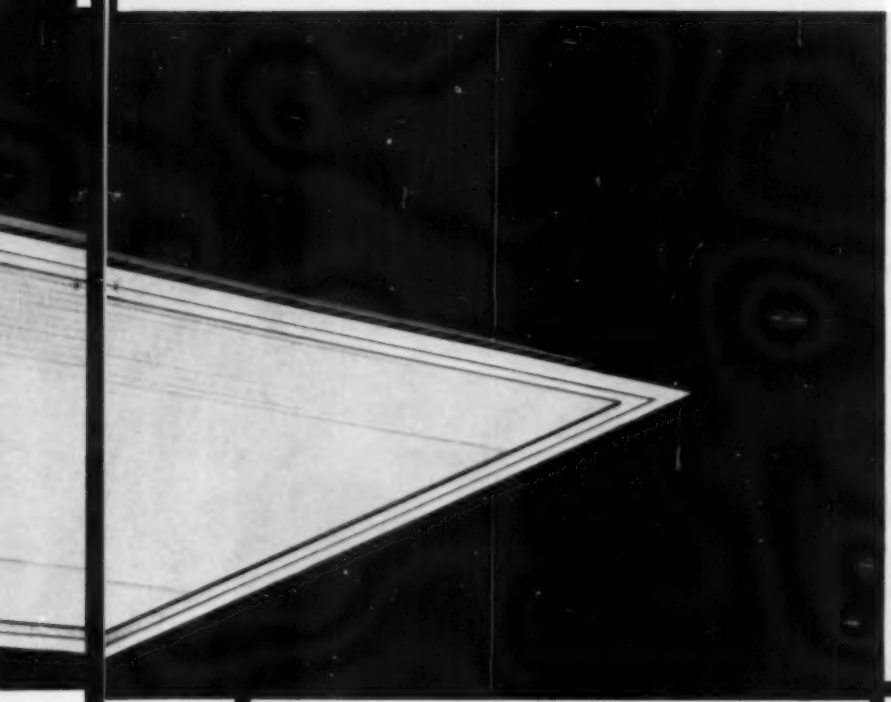
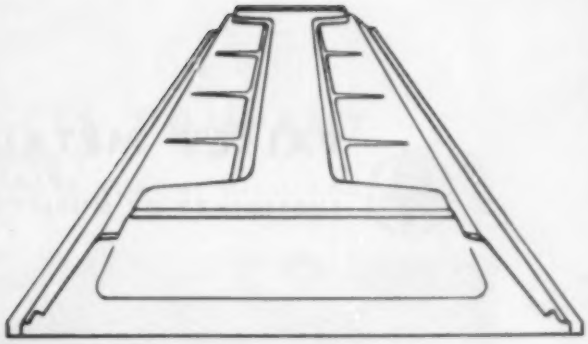
Exclusive patented aluminum Paralouvers® reduce "glare-zone." Alzak body and center louver form parabolic shape, control brightness from side. Available in 4-foot, 8-foot, and fill-in sections for all plaster and acoustical ceilings. Width 12 inches. Rapid-Start or Slimline lamps. New low prices.

Plastic Cleartex

Exclusive light weight, low-brightness, high light transmission Plastic Cleartex enclosure hinges from either side for easy maintenance. Supplied as 4-foot, 8-foot, or fill-in sections. Two or three lamps, Rapid-Start or Slimline. For all plaster or acoustical ceilings. New low prices.







SHALLOWER by a full 2-inches, "rigidized" construction, new Mobilex takes less space, increases design freedom, produces better specifications.

Introducing a New Mobilex...available now! Brilliant achievement in fixture design! Superb expression of the modular concept. Compatible with 97 different ceiling systems for the ultimate in modular assembly.

Available as 2-foot, 4-foot, or fill-in sections. Two, three, or four lamps. Mount end to end or side by side. You can even install additional fixtures later, *inexpensively*, because Mobilex is interchangeable with acoustical ceiling panels.

Now two inches shallower, ⅓ lighter, new Mobilex is faster, safer, easier to install.

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New Low Price... Mobilex now wears a new, lower price, too. Add this to its proved reputation for low installation and maintenance costs and you can see why Mobilex is in a class by itself—by every standard.

See and inspect new Mobilex soon. Your local Day-Brite representative will gladly arrange a demonstration. He's listed in the Yellow Pages.

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VALLEY METAL PRODUCTS COMPANY

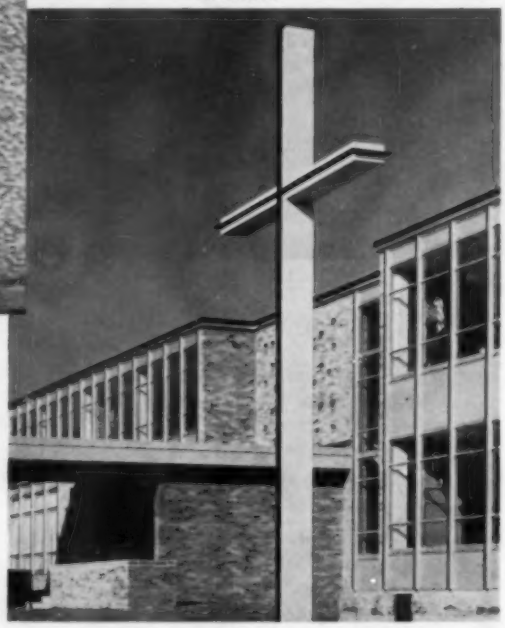
PLAINWELL, MICHIGAN

SUBSIDIARY OF MUELLER BRASS CO., PORT HURON, MICHIGAN

Photo By Rempes

P. ARTHUR D'ORAZIO
Architect

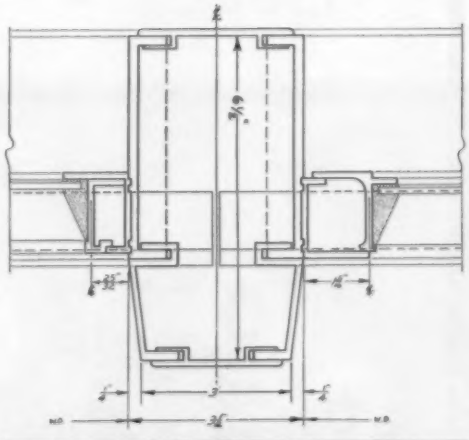
CHARLES SHUTRUMP & SONS
Contractors



The TREND in modern school construction is to VAMPCO HEAVY SECTION ALUMINUM WINDOW WALLS

There are many sound reasons why the architects and builders of over 7,500 modern school buildings have turned to the famous Vampco Aluminum Windows of one type or another. Functional design, structural strength, better lighting and ventilation, lower cost and durability are but a few. The beautiful new Cardinal Mooney High School at Youngstown, Ohio is a striking example of this new trend in institutional construction. Vampco Heavy 6½" Window Walls with insulated panels take the place of masonry construction. The speed with which these one and two story sections were erected on the job saved many days' time in the completion of the building. Vampco Aluminum Windows for every type of construction are available in casement, combination casement, awning, intermediate projected, window wall of varying sizes and thicknesses, heavy ribbon construction, glass block and custom designed types. Dept. PA-117.

VAMPCO SERIES 200 HEAVY SECTION WINDOW WALL



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VAMPCO

A NAME THAT MEANS THE VERY FINEST IN LIFELONG ALUMINUM WINDOWS

VALLEY METAL PRODUCTS COMPANY

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SUBSIDIARY OF MUELLER BRASS CO., PORT HURON, MICHIGAN

FULTON, KRINSKY AND DELA MOTTE
Architects
SORENSEN AND GROSS
Contractors

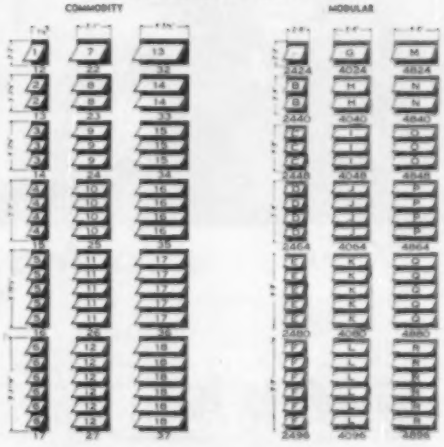
Mammoth Ann Arbor Senior High illustrates wide versatility of VAMPCO and VAMPCO TRU-SEAL ALUMINUM AWNING WINDOWS

With the addition of the Tru-Seal Awning Windows to the VAMPCO Aluminum Window line, VAMPCO now offers the greatest product versatility of any aluminum window manufacturer in America today! The mammoth new Ann Arbor Senior High School, with exterior walls stretching over one mile to completely encircle the school, is constructed with a wide variety of VAMPCO and VAMPCO TRU-SEAL Aluminum Awning Windows and Window Walls, and VAMPCO Intermediate Projected, Class Room, Glass Block and Custom Aluminum Windows and Window Walls. In addition to these types, VAMPCO offers a wide range of casement, combination casement, light and heavy tubular, heavy section, heavy ribbon, multi-story, basement, utility and church windows. The trend is definitely to *Aluminum Windows* and to *VAMPCO*. You can't beat them for better lighting and ventilation, lower installation and upkeep costs, beauty, durability and structural strength. Investigate before you specify!

Photos by Talbot Studios

VAMPCO TRU-SEAL ALUMINUM AWNING WINDOWS

STANDARD SIZES (In Stock)



write DEPT. PA-117 FOR FULLY ILLUSTRATED LITERATURE ON VAMPCO and VAMPCO TRU-SEAL ALUMINUM WINDOWS.

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NAMES THAT MEAN THE VERY FINEST IN LIFELONG ALUMINUM WINDOWS

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AIR DIFFUSERS

Custom made in unlimited air patterns, AGITAIR square and rectangular air diffusers suit all job conditions . . . blend perfectly with any interior design.

These AGITAIR diffusers need not be centrally located. They assure draftless, noiseless, equalized air distribution from any location in the ceiling or side wall.

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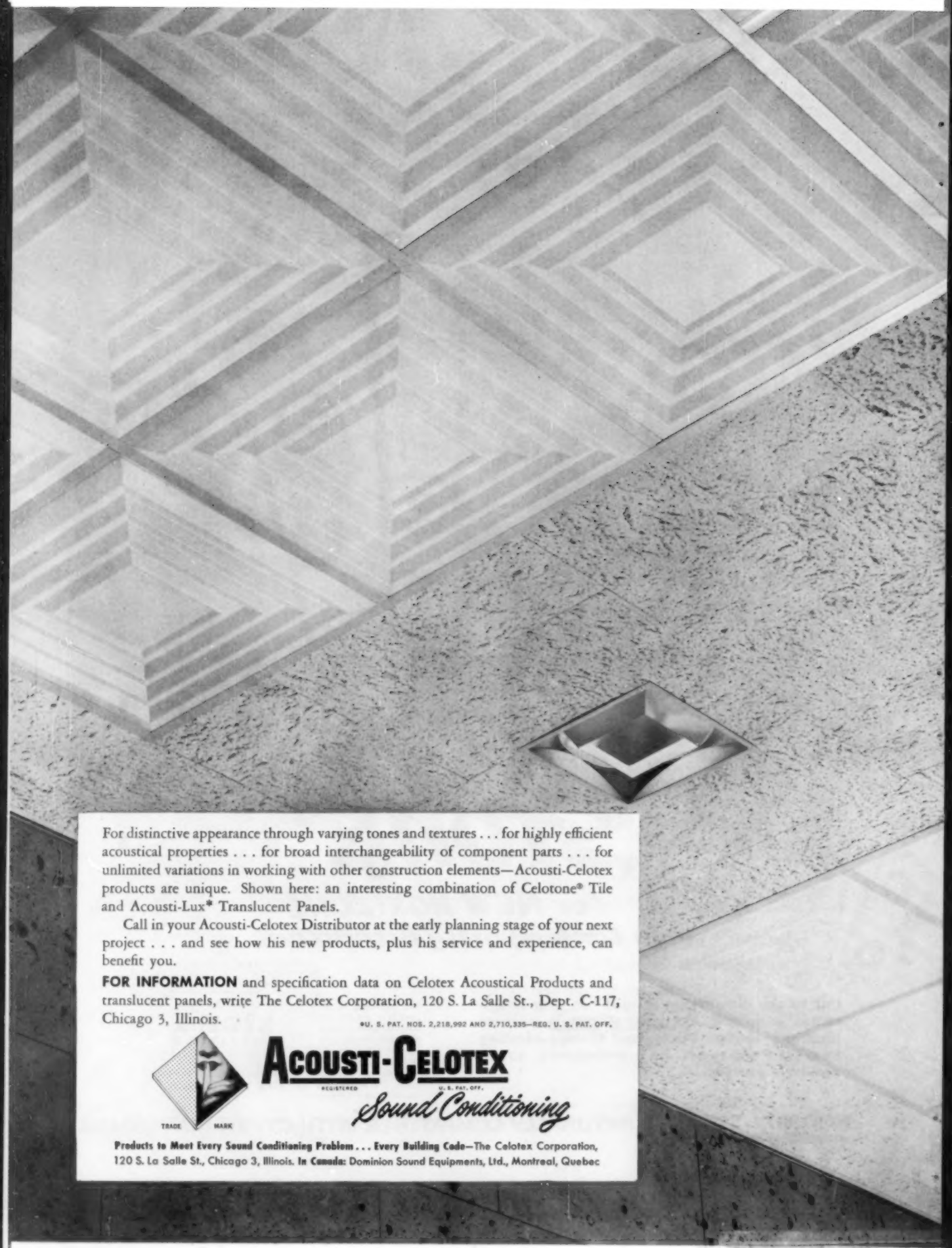

For distinctive appearance through varying tones and textures . . . for highly efficient acoustical properties . . . for broad interchangeability of component parts . . . for unlimited variations in working with other construction elements—Acousti-Celotex products are unique. Shown here: an interesting combination of Celotone® Tile and Acousti-Lux* Translucent Panels.

Call in your Acousti-Celotex Distributor at the early planning stage of your next project . . . and see how his new products, plus his service and experience, can benefit you.

FOR INFORMATION and specification data on Celotex Acoustical Products and translucent panels, write The Celotex Corporation, 120 S. La Salle St., Dept. C-117, Chicago 3, Illinois.

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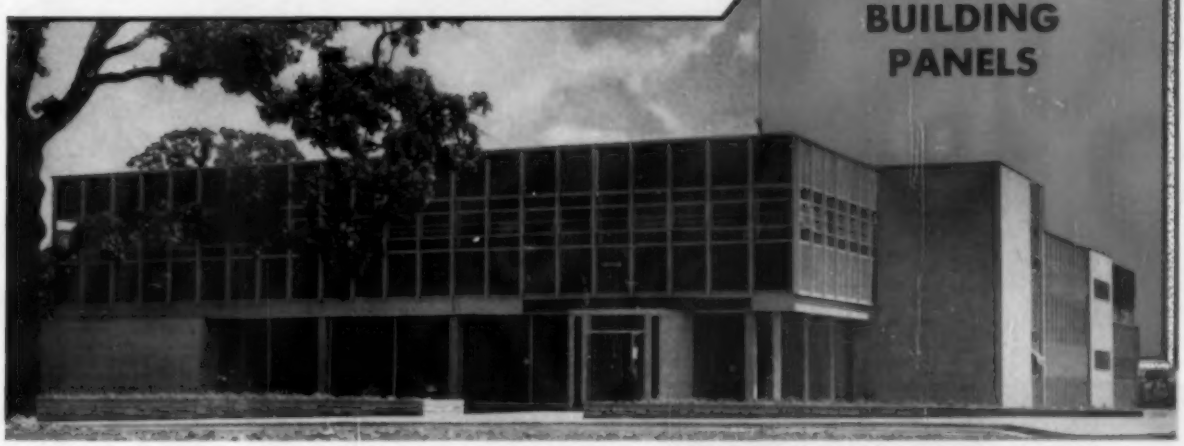
For fast construction and bonus floor space . . . specify modern

HASKO-STRUCT BUILDING PANELS



■ Buildings go up faster . . . construction costs go down . . . floor space increases with versatile Hasko-Struct building panels on the job.

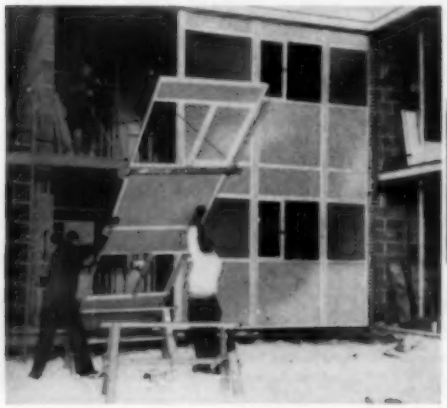
Along with being prefinished, Hasko-Struct plastic laminated panels are structurally strong, moisture-proof, noncorrosive, rot-proof, vermin-proof, lightweight and provide a constant insulating value. They add a modern appearance to curtain and window wall buildings . . . are easily installed with a minimum of labor.

Hasko-Struct panels are available in a wide range of stock sizes and thicknesses, or in special sizes when specified. For the complete story on the advantages of Hasko-Struct panels, write: Haskelite Manufacturing Corporation, Department BP, Grand Rapids 2, Mich.

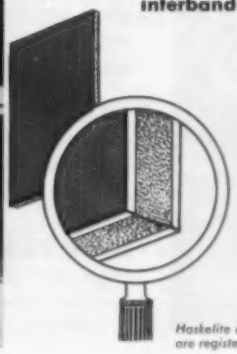
Monsanto Chemical Company's new laboratory in St. Louis represents the most thorough use of plastics in a commercial building in the world. Hasko-Struct panels played a basic structural role in this new building. Architect—Holabird & Root & Burgee, Chicago.

The modern, attractive appearance that can be gained with Hasko-Struct panels is shown here in the students' dormitory at Marion College, Marion, Ind. Architect—Orus O. Eash, Fort Wayne, Ind.

New student housing project at Michigan State University goes up rapidly with Hasko-Struct panels. Entire wall can be installed without using expensive erection equipment. Architect—Manson Carver Associates, Lansing, Mich.



These lightweight panels incorporate Haskelite's own Polyester Resin impregnated fiberglass cloth faces, bonded to cement asbestos interbands, and a foamed polystyrene core.



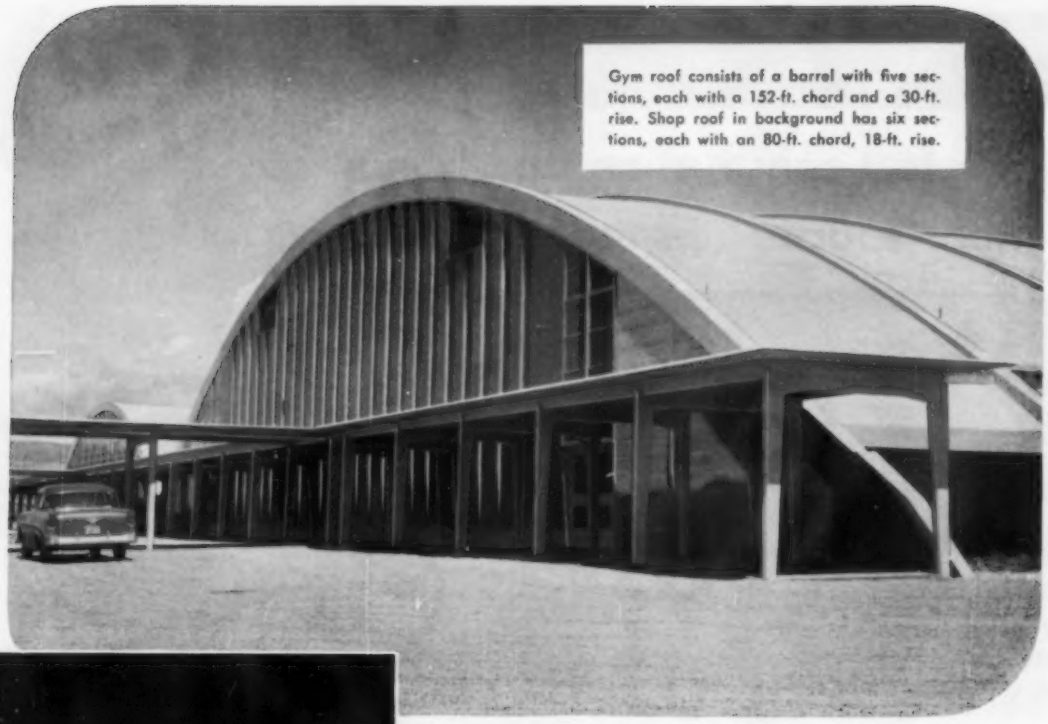
HASKO-STRUCT

HASKELITE

MANUFACTURING CORPORATION

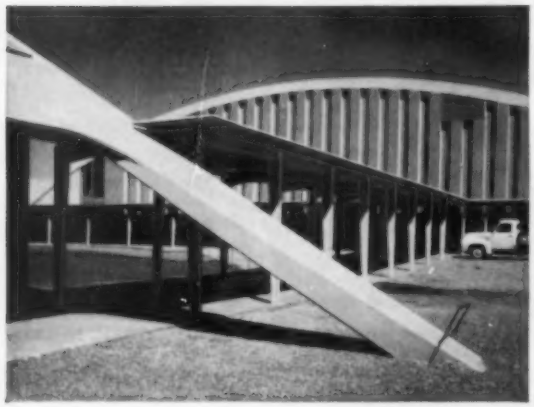
Grand Rapids 2, Michigan

Haskelite and Hasko-Struct are registered trademarks



Gym roof consists of a barrel with five sections, each with a 152-ft. chord and a 30-ft. rise. Shop roof in background has six sections, each with an 80-ft. chord, 18-ft. rise.

The roof of the multi-purpose building, above, consists of seven 60-ft.-long barrels, each with a 32-ft. chord and 23-ft. radius. Photo below shows the type of covered walks (precast concrete bents) used on the campus. The architect was Maloney & Whitney, Yakima, Wash. The structural engineer was Worthington & Skilling, Seattle. The contractor was Wall, Bartram & Sanford, Wood Village, Troutdale, Oregon.



CONCRETE SHELL ROOFS

answer school's need for unobstructed floor areas

The Ellensburg High School, Ellensburg, Wash., demonstrates the versatility of concrete shell roofs for educational structures. Large unobstructed floor areas were required for three types of buildings: the gymnasium, the shop building and a multi-purpose building. Concrete barrel shell roofs were chosen for all three.

Shell roof construction provided the unobstructed floor area required. It was economical to build and opened unusual design opportunities to the architects.

More and more architects and engineers are turning to concrete shell roofs for structures requiring open floor areas. Roofs with spans up to 300 feet and more can be built without any interior columns. In addition to school buildings such as shown here, concrete shell roofs are ideal for auditoriums, exhibition pavilions, hangars, field houses, train sheds, repair shops for large equipment, garages and warehouses.

Concrete shell roofs offer additional advantages of low maintenance cost, long life, low insurance rates and ***low-annual-cost*** service. Send for free illustrated booklets. Its distribution limited to the U.S. and Canada.

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Outstanding economy for architects: UALCO Modular Windows save money by helping to eliminate error, by reducing drafting time.

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The following UALCO Aluminum Windows and all four series of UALCO Curtain Wall are available in modular sizes (4″ module) at no extra cost, for installation in any construction: Awning, Awning Hopper, Intermediate Projected, Double Hung, Casement, Casement Hopper, Horizontal Slider, Verti-Slide, Glass Block Ventilator. Sweet's

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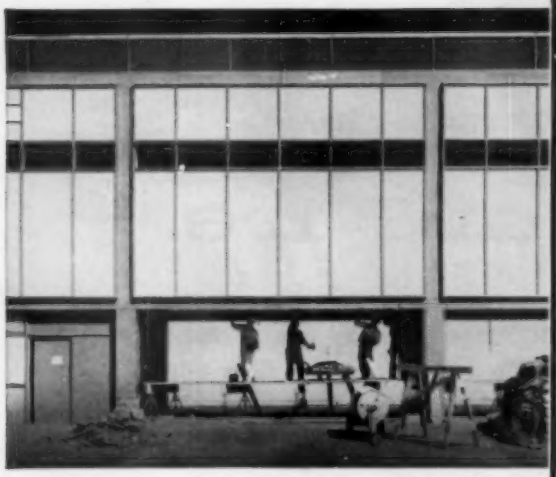
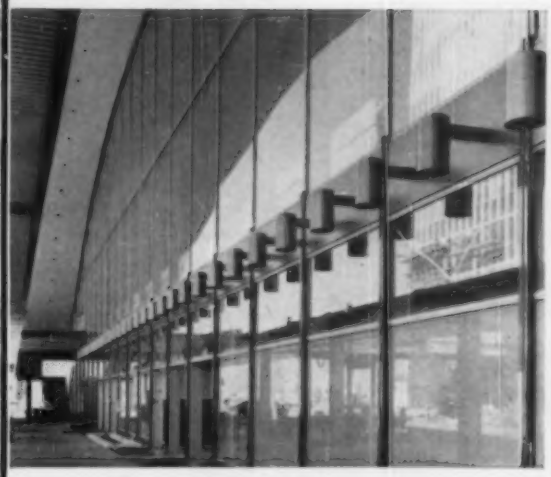
PHOTOS BY LIONEL FREEDMAN

CUSTOM CURTAIN WALLS





It is axiomatic in industry that the greater the number of identical parts; the lower the cost. Varying the parts by modular increments permits greater flexibility of design while retaining a degree of economy.

One of the more important parts of the building to which this industrial truth applies, is the contemporary curtain wall. Here, modular design makes feasible the use of custom curtain walls for all buildings, thus avoiding the possible monotony of "standard" designs. Standardization of parts can be achieved without standardizing buildings.

In accord with architects' specifications, manufacturing and erection techniques were developed in the shop fabrication of units requiring no cutting or fitting at the building. As specialists in custom curtain walls, regardless of the modular dimension employed, we at FLOUR CITY are skilled and experienced in providing architects with true quality features from their specifications.

The modular planning of New York Airport's International Arrival Building and adjacent Airline Wing Buildings has achieved structures with a magnificent sense of order expressed by the attractive grid of aluminum and stainless steel window enframements. Almost 53,000 lineal feet of these members were shop fabricated into unit frames and erected by FLOUR CITY—producers of only the finest metalwork since 1893.

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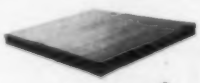
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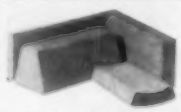
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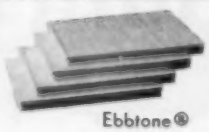
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In Quality Control, **too, flame is the test. The random sample of Fesco Board, being placed in the furnace above, is removed after fire testing at approximately 1700° F. Note that even after exposure to this extreme temperature Fesco Board retains its basic shape and structure.**

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Glued laminated arches which function as the main structural component of the building, permit the use of economical, non-bearing side wall design. For instance, notice the attractive display of glass-wall construction in the photograph above.

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CURTIS MODULAR MEASURE RECESSED LUMINAIRES provide high level general illumination, low-brightness quality in the American Hardware Mutual Insurance Company Building, Minneapolis, Minn. Architects: Thorshov & Cerny.

Curtis Eye Comfort Alzak Aluminum Troffer with L.B.Q. Louver Fin. Snap-on yoke and toggle bolts for easy application: New shallow depth . . . maximum recessing space required, 6½″.

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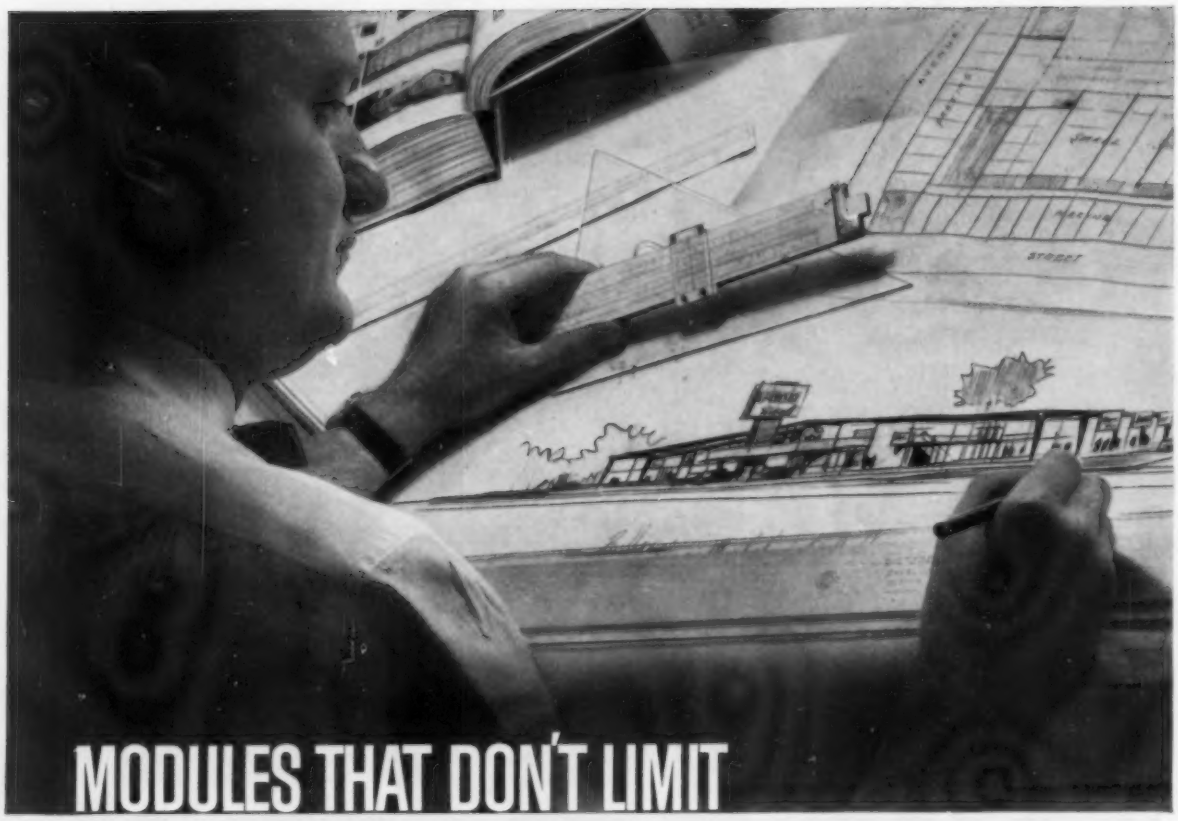

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Here is a refreshing new approach to modular construction. It is a system of building that gives you, the architect, control over both the structural form of the building and the finished appearance. It is the Butler Building System.

In the Butler Building System, the module is a unit of space—a building bay. This bay is comprised of pre-engineered, mass-produced, load-bearing structural components, and die-formed, tight-fitting metal roof panels. It is available in a wide variety of heights, widths, lengths and roof slopes. Use of the Butler bay module reduces drafting room time, and brings to the construction site the economical control of quality attainable only on the production line.

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No other modular system opens so wide the door to creative imagination. In no other modular system is the end product so clearly your trademark . . . so decidedly a tribute to your individuality.

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met our highest expectations."

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Designers and Manufacturers of Sterilizers, Surgical Tables and Lights

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R. P. MARTIN
MANAGER

June 7, 1957

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Sincerely yours,

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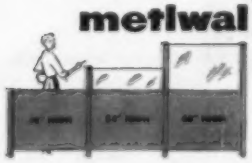

metlwal jr for increased efficiency at low cost . . . your choice of railing height, semi-private, or private enclosures . . . adaptable to any floor layout . . . as easily rearranged as office furniture . . . in 6 decorator colors.

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Modular Architecture with a personality all its own is reflected by the Wilson Junior High School, Charlotte, N.C. Architects: A. G. Odell, Jr., & Associates.

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The concept of Modular Planning calls for building components that give the architect even greater freedom, rather than limit him. Such is Ceco Curtainwall, which permits freedom of originality . . . flexibility . . . versatility . . . utility. Ceco provides either aluminum or steel sections that allow a variety of architectural treatments, yet live in a complete harmony with panels of stone, marble, glass or coated metals. Furthermore, you gain these added advantages when you specify Ceco Curtainwall: speedy erection—light construction—economy of materials—4 to 6% more floor space.

Model of Modular Design employing Ceco Products is the Wilson Junior High School, Charlotte, N.C. Occupied within 8 months after bids were taken, this 3-wing structure tastefully blends Ceco Aluminum Projected Windows with porcelain enameled panels. Most unusual effects have been attained by adapting panels of various color arrangements . . . and colored glass is used to complement the panels.

For greatest freedom in design—for the world's widest line of quality Aluminum and Steel Curtainwalls—see Ceco Steel Products Corporation—general offices, 5601 West 26th Street, Chicago 50, Illinois —offices, warehouses and fabricating plants in principal cities.

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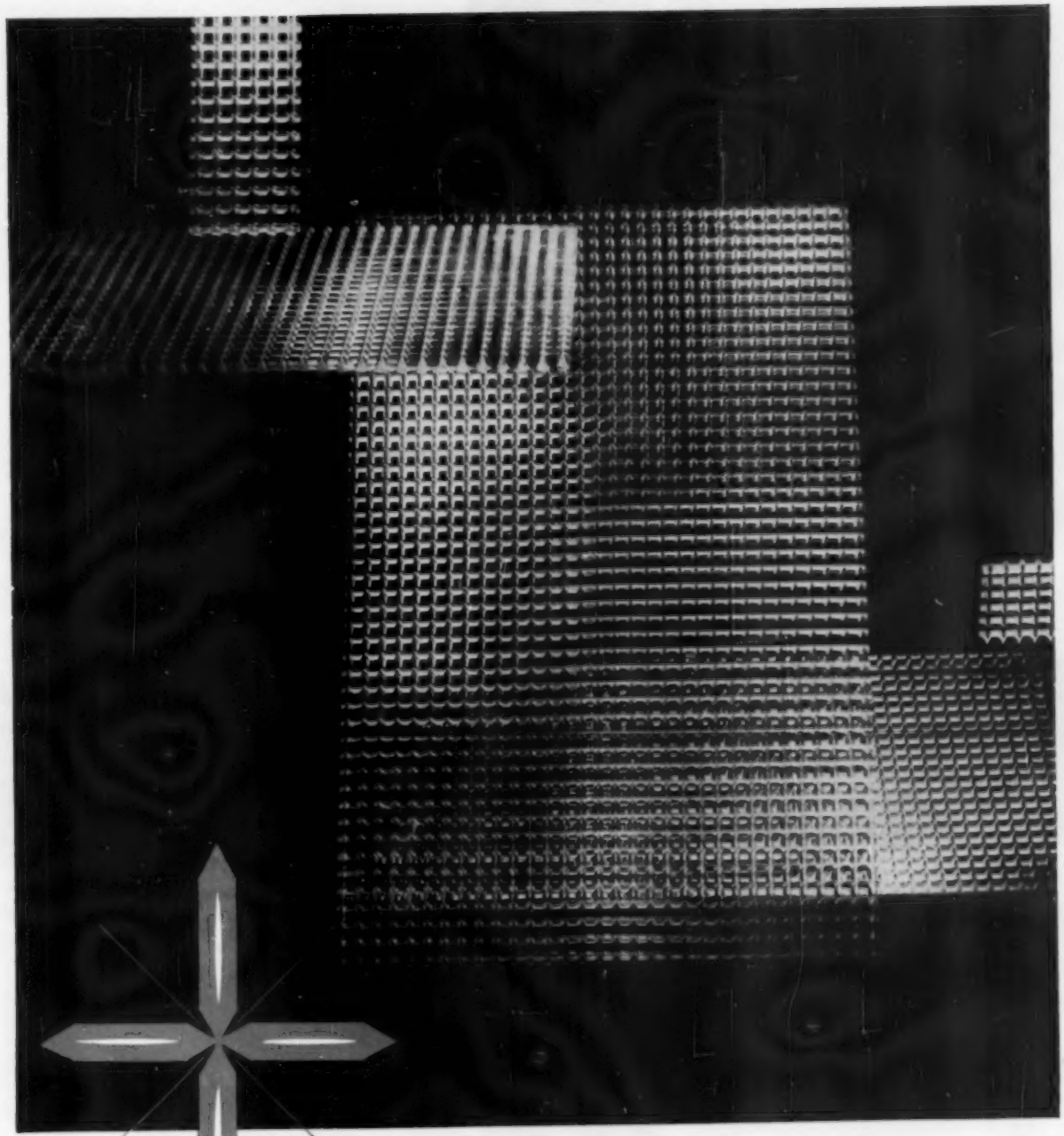

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FIXTURES BY THE EDWIN F. GUTH CO.,
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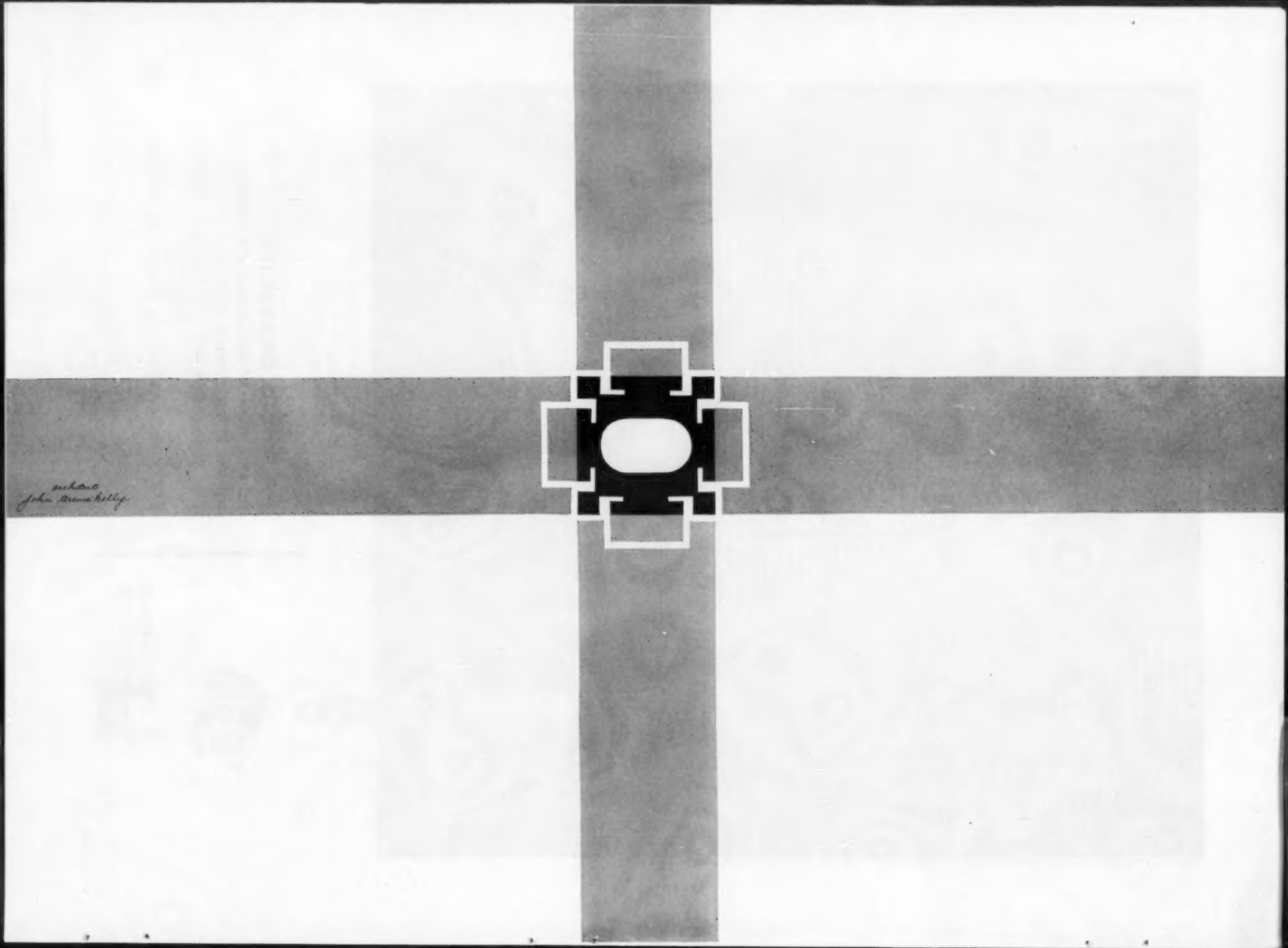
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John Meunkelly

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the joint

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Lightweight, Translucent Curtain Wall Panels

a new basic building component

A new basic building panel, introduced by the Kalwall Corporation of Manchester, New Hampshire, is opening new horizons for curtain wall design in modular buildings.

The new panel, called Kalwall by its manufacturer, is a sandwich structure of reinforced polyester fiberglass sheets bonded to an aluminum grid core. Panels weigh only 1.5 lbs/sq. ft. yet are so strong and rigid they meet all commercial and institutional requirements. Panels are fire resistant, have a high insulation factor, and can be interspersed with other modular components under a variety of joint systems.

Design possibilities with Kalwall Panels are unlimited. During the day the translucent panel provides soft, restful illumination for interiors. At night, inside lights make panels glow outwardly with a striking luminous effect. Panels are manufactured in six basic translucent colors: soft green, blue, rose, yellow, white and crystal. Sections within a panel may be alternated in color to achieve a stained window effect.

Developed over the past 5 years, Kalwall Panels have been field-tested in over 60 installations. Another 300 have been specified or are presently under construction. For a full description, test data, specifications and construction details send in the coupon below.

*Patented and Patents Pending

Standard Sizes

4'x20' 4'x12' 4'x10' 4'x8'

2¾" or 1⅛" thick

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TRANSLUCENT PANELS*

KALWALL CORPORATION
42 Union Street, Manchester, N. H.
Please send me free of charge, complete information and specifications on Kalwall Translucent Panels.

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Firm Name _____

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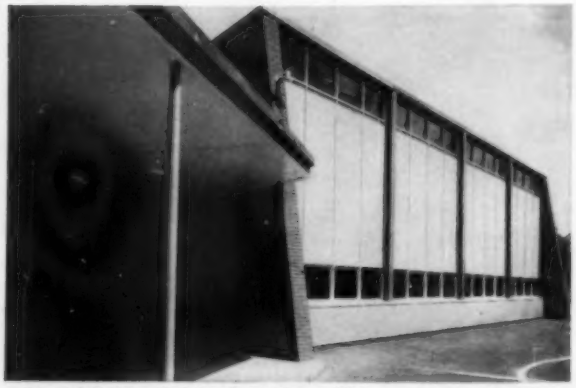
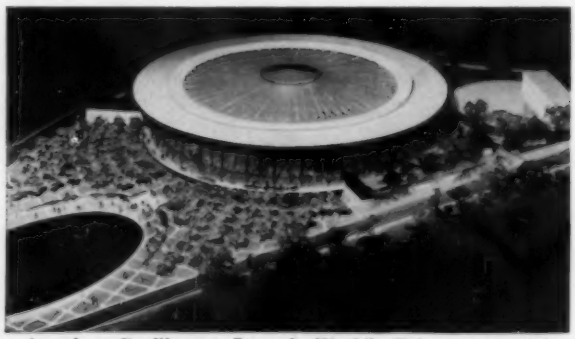


Daniel J. Hurld School, Woburn, Mass., was modular designed using standard 4'x20' Kalwall Translucent Curtain Wall Panels for improved interior lighting. Architect: Perley Gilbert, Lowell, Mass.

Modular designed Temple Emanuel, Lawrence, Mass., uses Kalwall Translucent Panels to control daylight and regulate heat loss in its auditorium.



American Pavilion at Brussels World's Fair uses special Kalwall Panels to form its 340', free-span translucent dome. Architect: Edward D. Stone, New York. Contractors: Blanton-Aubert, Brussels.

Weis *Vitre-Steel* toilet compartments

–fired on steel at 1550°

Weis *Vitre-Steel* toilet compartments are finished in genuine porcelain . . . fired on steel at 1550°, both inside and out. Exposed surfaces are then re-fired in your choice of colors to complement any décor. Edges are bound in stainless steel; construction details satisfy most rigid specification standards. Weis *Vitre-Steel* is built to defy use and abuse wherever installed — in schools, hospitals, office buildings, factories, or any building handling a high volume of traffic. Glass-hard *Vitre-Steel* is also highly resistant to acids, cleaning compounds . . . even defacement. Available in Hi-Stile and Floor-Braced types or Ceiling-Hung type illustrated. Get the facts on Weis *Vitre-Steel* before specifying. Send coupon for complete information and catalog.

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and lifetime hardware, too!

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Please send specifications and catalog of Weis toilet compartments.

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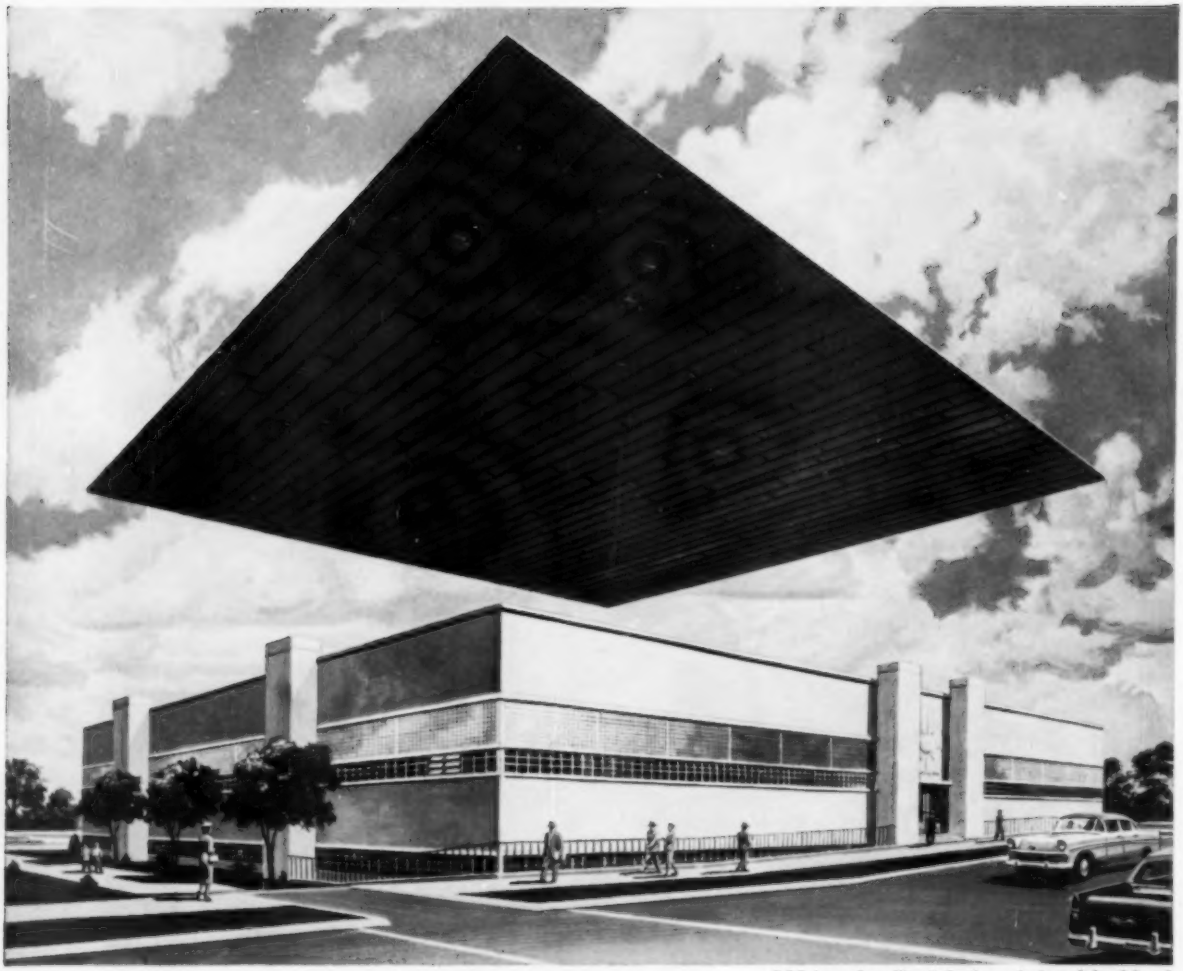

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For lasting protection to buildings and contents

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J-M Aquadam Roofs owe their superiority to Aquadam, the modern cementing agent used in the application of the roofing felts. Aquadam, by laboratory test and years of actual performance, is considered the best dead-level bitumen on the market today. It is designed to encompass the best features of coal tar pitch and of asphalt without their weaknesses.

Aquadam Built-Up Roofs employ Asbestos felts for smooth-surfaced roofs, rag felts for gravel- or slag-surfaced roofs.

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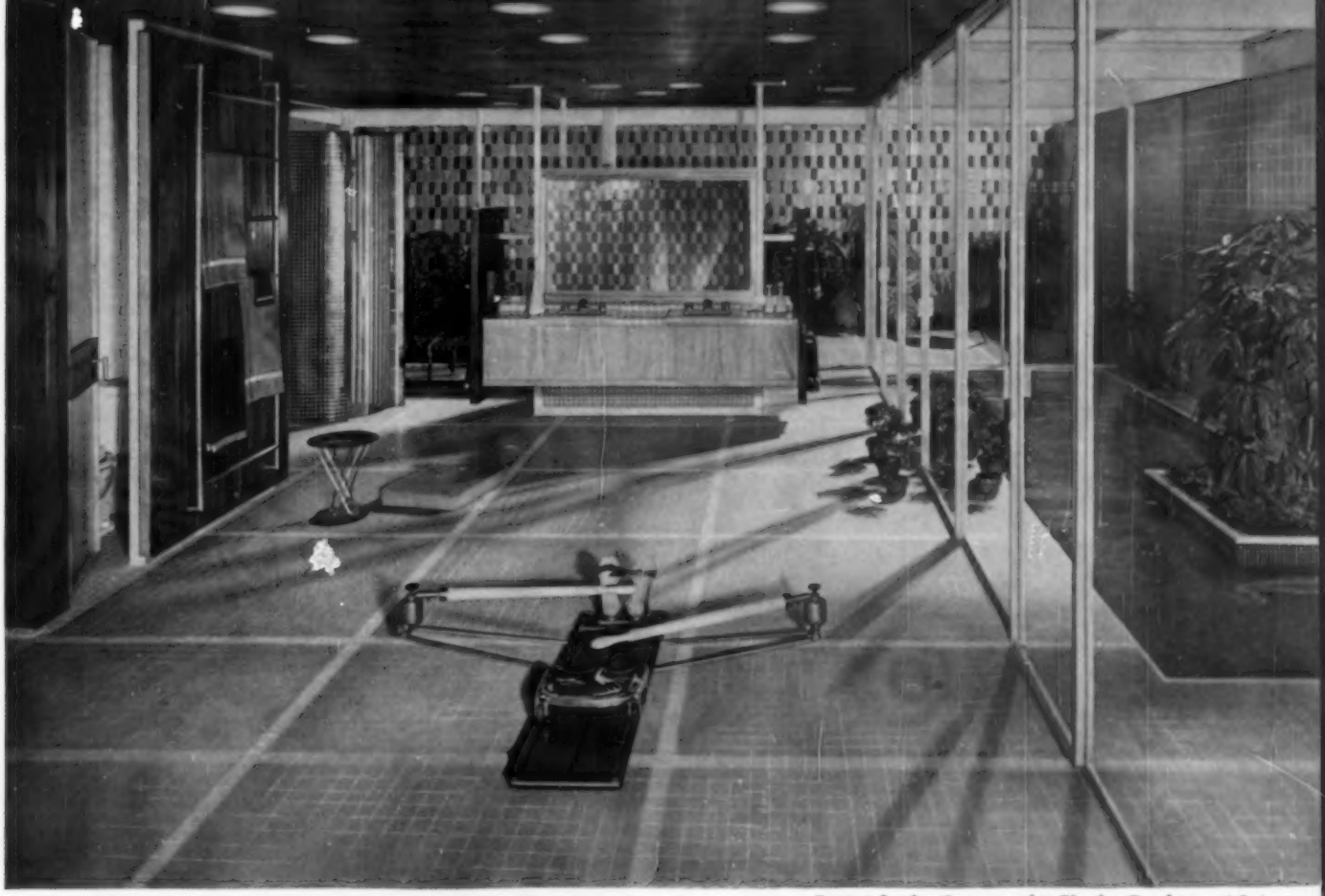

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Chas M Goodman

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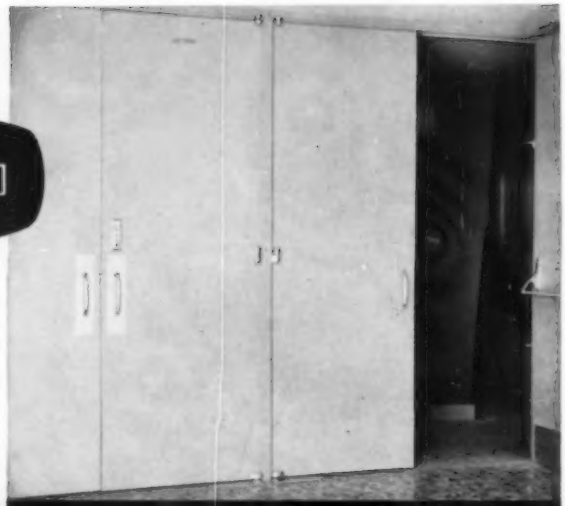

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preview

for december

PROGRESSIVE ARCHITECTURE

PLANNING FOR AIR TRAVEL

P/A will devote its main December editorial section to the advances made in *Airport Building Design* since the Airport Building issue of MAY 1953; which superior projects are under way right now; and what the future holds for this increasingly important building type.

The main presentation will be on the gigantic New York International Airport complex, illustrating and discussing individual buildings in the scheme, and the 4900-acre airport as a whole. Also scheduled for DECEMBER P/A are airports in Mexico, England, and Switzerland, and plans for "airport of tomorrow," by Victor Gruen Associates.

Materials & Methods Articles: "Axially-Stressed-Wide-Span Structures," by Paul Chelazzi; and "Expansive Clays," by David M. Greer of Greer Engineering Associates.

PROGRESSIVE ARCHITECTURE
means
ARCHITECTURAL PROGRESS

MODULAR ASSEMBLY

the art of design with standardized parts

As far as the technical aspects of building are concerned there is no question that we must develop a method of building these buildings precisely, lightly, and quickly—and this, of course, leads to prefabrication. Today's buildings are primarily being built as they were 40 years ago. Only the skins are different, but the basic construction is the same (as) when the Woolworth Building was built.

GORDON BUNSHAFT, Architect
Skidmore, Owings & Merrill

prefabrication

I have ceased to consider a wall as being something that you punch a hole into. It's a series of parts joined together. Those parts consist basically of two kinds: the opaque element and the transparent element. . . . That kind of thinking immediately moves you into preassembly.

CHARLES M. GOODMAN, Architect

The imagination of the . . . public has been stirred by this word (prefabrication). It caught the public's fancy because it corresponded to the realities of American experience—namely, that the only way to produce enough goods for everybody is industrially.

JAMES M. FITCH
Associate Professor of Architecture
Columbia University

Our lives, our thoughts, our actions, everything we do is molded by the mass-production principle, the greatest revolution in history. . . . None of us can deny that it shows promise for the first time of making it possible to mitigate want, suffering, and the low standards of living of the world's population . . . there are few jobs which can be more satisfying for the designer than to put the mass-production genii to work on the provision of better shelter.

CARL KOCH, Architect

With many of the building products today already available in widths of 4 ft, it is quite obvious that the 4-ft module sets the pace in prefabrication at this time. In mass production of engineered housing, it would be an obvious mistake . . . to build a gigantic pile of waste material. Most prefabricated home manufacturers cling to the 4-ft module wherever possible, making as few off-module panels as is absolutely necessary to meet the architectural planning conditions.

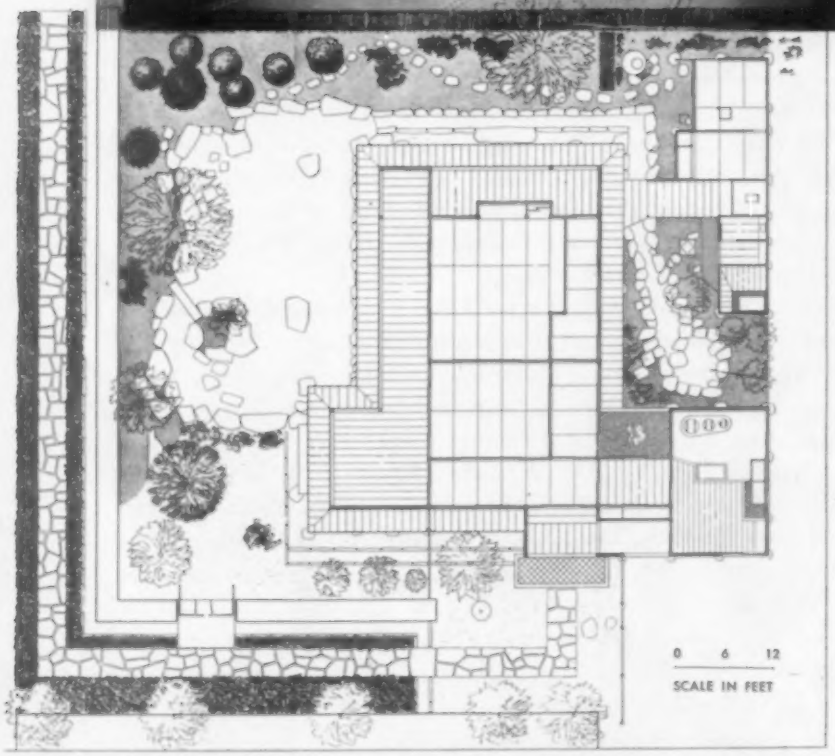
GORDON G. HAZELL, Technical Director
Prefabricated Home Manufacturers' Institute

It is a belief, commonly stated and commonly accepted, that the building industry is the one large factor in our economy that has not yielded to the techniques of mass production. This has been true, actually, only in degree and the magnitude of that degree seems about to change, radically, in the very near future. The effects—on architecture and engineering in the drafting room, on manufacture of building components in the factory, and on construction methods in the field—can be of tremendous importance. What is this impending change, what is its background, and what are its implications? We define it as MODULAR ASSEMBLY. Its background is varied.

Two extremes have characterized design-manufacture-construction of buildings up to this point. On the one hand, every product and material that goes into a building is mass-produced in a factory, by presumably advanced industrial-production methods: from nails to wall panels, factory-made items are shipped to the job site. On the other hand, both in design of buildings using those products, and in the wilful cutting, patching, and wasting to make them fit together on the construction site, there often exists the farthest possible extreme from automated assembly-line techniques. The first industrial revolution produced our materials; the second has affected our methods scarcely at all.

MODULAR MEASURE—These two extremes have been brought closer in recent years. For one thing, more products have been manufactured so that they fit together without job adjustment (dimensional co-ordination)—a first step in any industrial assembly practice. For another, more architectural and engineering offices have learned to utilize these co-ordinated-dimension products in their designs (modular drafting). These two concepts, which have been promoted as Modular Measure by a vigorous industry group working with the American Standards Association, have had a slow but accelerating effect on the industry since the formulation of Albert Farwell Bemis's original "cubical modular method."

PREFABRICATION — Factory assembly of building parts has also provided a small but effective demonstration of higher degrees of mass production in building. Total "prefabs" have never fulfilled the quantitative promise they once made—and,



Japanese house is a classic example of modular design, based on floor-mat size. (Above, *exhibition house designed by Junzo Yoshimura for Museum of Modern Art, New York). G.M. Technical Center* (below); *Eero Saarinen & Associates and Smith, Hinchman & Grylls, Architects, carries wall-system module into ceiling grid.* Photos: Ezra Stoller; Alexandre Georges

structure/use modules

The whole trend of current design esthetically seems to lean toward the visual expression of a controlling grid on modular lines as the essential pattern of the building . . . even in the more recent expressions of the controlled surface, thin shells, folded plates, etc.

A. GORDON LORIMER, Architect

I discovered that working to a dimensional module gave direction and discipline to my work, and resulted in efficiency and economy in the use of structural parts for building. I also found—and this was possibly the most important factor—that the principle of dimensional order applied to the design of a structure resulted in a quality in the work which could not be captured in any other way.

ERNEST J. KUMP, Architect

The practical horizontal and vertical division or office unit is naturally based on a room of comfortable area and height, and the size of this standard office room as naturally predetermines the standard structural unit, and, approximately, the size of window openings. In turn, these purely arbitrary units of structure form in an equally natural way the true basis of the artistic development of the exterior.

LOUIS SULLIVAN, Architect

I am working on architecture as a language and I think it has to have its grammar in order to be language. It has to be a living language but still in the end you come to the grammar. When you use it for normal purposes, you speak in prose. If you are good at that, you speak a wonderful prose; and if you are really good, you can be a poet. Yet it's the very same language. I believe it is the same in architecture. If you have to construct something, you can make a garage out of it or you can make a cathedral out of it. The same means, the same structural methods you use for all these things. The structure is the basic grammar.

MIES VAN DER ROHE, Architect

curtain walls

The wide acceptance, all over the world, of curtain wall buildings will force testing, standardization, and acceptable procedures of fabrication and erection. The complexities are great, but today we have the facilities and the know-how to solve the problems. . . . In this country, with few exceptions, its merits of adaptability have been only partially realized—that is, as buildings faced on one flat plane.

HAROLD SLEEPER, Architect

Whether we like the idea or not, it would be blindly unrealistic not to recognize in these ubiquitous curtain walls a hint of the machine-made character which will ultimately overtake nearly all building. . . . The significance of the boom in curtain walls that began about 1950 is that it marked the beginning of the end of the gentleman's profession of architecture which has served the world.

ROBIN BOYD, Architect

modular components

Very gradually the process of building is splitting up into shop production of building parts on the one hand, and site assembly of such parts on the other. More and more the tendency develops to prefabricate component parts of buildings rather than whole houses. Here is where the emphasis belongs. The future architect and builder will have at their disposal something like a box of bricks to play with, an infinite variety of interchangeable, machine-made parts for building which will be bought in the competitive market and assembled into individual buildings of different appearance and size.

WALTER GROPIUS, Architect

modular assembly

Modular co-ordination, in its aspect of standardized products and manufacturing processes, is inherent in the conditions of our time. . . . Two cans of pea soup are more alike than two peas. Units fit into the production process and combine with other units, as interest in the interconnections between modular units keeps pace with the development of the units themselves. The factors common to units become much more than repeated size and shape, and are extended to the units' capacity for being joined together. There is an increasing tendency to produce standard modular units which interlock without the intervention of such aids as nails and glue. Implicit in this development is the search for modules with the greatest combinatory possibilities; the ideal is a standard module that can be coupled with others into the widest variety of products.

GYORGY KEPES, Professor of Visual Design
Massachusetts Institute of Technology

I believe that eventually the balloon frame, the conventional construction system for houses, will disappear. Within the next ten or fifteen years all houses will be prefabricated . . . developed around some sort of modular structural frame, with prebuilt, prefinished panels.

CRAIG ELLWOOD, Architect

MODULAR ASSEMBLY has always looked like the best way to reduce the number of parts and construction operations necessary to produce a building. It therefore offers the best chance to reduce building costs and to make it possible for this country to obtain the buildings it needs.

WILLIAM H. SCHEICK, Executive Director
Building Research Institute

Most architects recognize the value of modular assemblies. . . . Building codes have played a part but not to the extent that many think. For example, no one has yet developed an exterior wall panel with as much as a two-hour fire-resistive rating. Yet this is the minimum that should be permitted up to property lines in the fire districts. However, basic building codes such as the Southern Standard Building Code do permit noncombustible exterior panels in all districts where the exposure is thirty feet or more on permanent open spaces or street fronts.

M. L. CLEMENT, Director
Southern Building Code Congress

in fact, as one builder has said, "the word *prefabrication* is anathema to the average public"—but they have shown how technically realistic a greater degree of industrial assembly can be. Perhaps they have proved that a building cannot be fully mass-produced (discrediting the cliché comparison with automobile production); but they have also proved that an assembly even of *proprietary* standard parts may limit, but does not necessarily stifle good design.

STRUCTURE/USE MODULES—Planning to a structural module has become standard design practice in recent years. The larger module may be 3 ft, 4 ft, 20 ft, or larger; it may be based on a typical office size, a typical classroom dimension, or a reasonable structural span. The thoughtful architectural man now carries this large-module planning concept far enough in his designing to make it adaptable to building products dimensionally co-ordinated to the smaller, 4-in. Modular-Measure unit.

PROPORTIONAL MODULES—Modular-scale divisions, a part of the search for harmony in architecture since Vitruvius, have had important recent restudy. Le Corbusier's *Le Modulor*, for example, has extended the search in a philosophical/esthetic direction; and the serious studies in modular number patterns at England's Building Research Station (July 1957 P/A) have carried the mathematical basis of interchangeability of parts very far toward practical application.

CURTAIN WALLS—The panel curtain wall has been the most dramatic recent move in the direction of an industrialized production assembly. A concept studied by many researchers for many years, it has suddenly (since about 1950) become almost an international cliché — used extensively, in fact, before its proper design and specification had been fully studied (June 1957 P/A). The curtain wall is not, however, a phenomenon complete in itself. Its significance lies in the fact that it has dramatically shown: the design possibilities (and dangers) in a *repetitive module*; the need for *co-ordinated components* in any process of assembly; the adaptability of many products to such a concept of *assembly of modular parts*; the resultant economies in time and labor; and finally, the *public acceptance of results* of this step to modular assembly.

MODULAR COMPONENTS — Standardized building products manufactured for site assembly are available today in almost every category of building construction. (Many of them are shown, listed, and advertised in this issue.) Tomorrow, their number will be vastly multiplied because almost every industrially minded manufacturer is thinking—and developing—in these terms. These components are not all carefully studied, yet, for full adaptation to Modular Measure. But from construction systems and structural materials—through all manner of roof, wall, floor, partition, and mechanical systems to fixtures, cabinets, and accoutrements—standardized units adaptable to co-ordinated design are being produced. Obviously, as one manufacturer has said, "materials manufacturers are interested in

making a lot of the same size. The material producer, turning out a lot of the same thing, can give the construction industry quantity and quality and can give it at an economical price." So mass production and the need for co-ordination are stimulating ever greater production of modular components.

MODULAR ASSEMBLY — The subject of this special issue, which we have termed MODULAR ASSEMBLY, is the cumulative total of all these background developments. It is an efficient assembly on the job site of modular components produced by factory mass-production methods, attached to a modular structure, designed and detailed by methods of Modular Measure. Obviously MODULAR ASSEMBLY is no new thing, except as it brings together and utilizes many older movements. And also, obviously, there will continue to be *degrees* of MODULAR ASSEMBLY. Building codes, craft-union rules, difficulties of utility connections and site adaptations, and other factors will still, here and there, prevent full use of the concept. But, even now, this issue indicates that there are examples ranging from the use of modular masonry and simple clip-on wall panels to near-100 percent assemblies.

STERILITY OR UNITY?—Extension of MODULAR ASSEMBLY is inevitable—*failure* to extend the method would make meaningless all the factors previously described, from industrial know-how to available products and design techniques. What, then, will be the architectural result—the design result for buildings and for cities? There are three current speculations about this:

It will produce sterility. Some see nothing but monotony and the stifling of design imagination in the approach to realized MODULAR ASSEMBLY. Ralph Walker has asked whether the future viewer of tomorrow's city will "think, with reason, that our buildings have been ever more brittle in their design, and that, increasingly, any possibility of tenant individuality was lost in sterile, unrhythmic repetitions of standardized parts—standardizations in which no where were the incidentals, the accidentals, or the intuitions permitted in evidence?" There is, of course, a body of opinion which answers "yes" to this question.

It will produce beauty appropriate to our time. Those who believe that "good" architecture is a necessary product of the social character and technological tools of its time are sure that beauty and imagination, as well as utility, are best served by using the "grammar" of today's modular components. The prospect of a grammar of "interchangeable machine-made parts for buildings, which will be bought in the competitive market," does not alarm many of the modern masters; it stimulates them. They see the possibilities of varied but unified design resulting—in the hands of an imaginative, "intuitive" architect. For examples of variety, warmth, and human scale within the modular discipline we might well look to traditional Japanese architecture.

It will produce a neutral design. There are critics who distinguish "industrial design" from other, more individual architecture.

We are faced, it seems to me, with the problem of finding the ability to design in such a way that we realize the machine is a freeing factor and not an enslaving one, and standardizations do not have to be repetitious to the point of being painful.

RALPH WALKER, Architect

The coming generation will certainly blame us if we should fail to overcome those understandable though sentimental reactions against prefabrication. If we are determined to let the human element become the dominant factor for the pattern and scale of our communities, prefabrication will be beneficial and must be encouraged for the ultimate social good. For it is a logical progressive means to bring design and production of buildings up to the level of 20th Century man.

WALTER GROPIUS, Architect

Always the desire to get some system of building construction as a basis for architecture was my objective—my hope. There never was, there is no architecture otherwise, I believe. What form? Well, let the form come.

FRANK LLOYD WRIGHT, Architect

I do not believe a gifted architect is ever limited by any component system or discipline as long as it is used as a tool for his imagination and taste and not as a dogma to be adhered to blindly. I believe the possibilities within any discipline are only limited by the urge for search and the degree of intuitiveness in the designer.

CHARLES M. GOODMAN, Architect

Whether the self-evident unity (produced by repetitive use of modular components) loses its possible positive emotional accent, and turns into the dissatisfaction of fatiguing monotony, will depend on the variation of over-all grouping, landscaping, color design, orientation to light influx, manipulation of shadows, etc.—all means of more subtle design which must be added to the mere "putting together."

RICHARD J. NEUTRA, Architect

The number of musical compositions of our Western civilization is literally countless and all different, each from the other. . . . All are written on twelve standardized notes. . . . Again, it is astonishing what uniformity and repetition can do when set to good rhythm and routine on fairly good legs. It is even more astonishing how homely the individual chorus girl can be in her architectural details and yet not spoil the show, provided she doesn't dress and dance to her own taste regardless of the others. . . . The group, or street, or community may have charm and beauty provided we architects and planners arrange the units of our routine as skilfully as are those of a well trained chorus.

GROSVENOR ATTERBURY, Architect

neutral design

More well designed individual components will produce a richer palette for the designer. One can achieve order, establish scale, rhythm, pleasant pro-

portions, interplay of textures. I believe it was Beethoven who said that you must find the order, learn the system, and understand it so that you will know when and how to break the rules. There are bound to be some (buildings) which may break away from the system entirely to accommodate special requirements. . . . But underlying all this will be a unifying system of construction and materials.

GEORGE MATSUMOTO, Architect

For many years our office has produced nothing but modular buildings, based on the 4-in. increment. . . . We join with the constructing contractors in attesting to the consequent modular profit this system has generated in cash for architect, contractor, and owner.

C. E. SILLING, Architect

The MODULAR ASSEMBLY problem is a puzzling one. . . . I have felt that there are areas where modular construction is a natural but already systematized one, and others where, fortunately, we still have frontiers. I believe the porcelain-enamel grid façade and the (modular) framing systems fall into the former category. There is no question but that design initiative is channeled, if not limited . . . yet these grids do contribute to an over-all unity. . . . My interest is mainly in precast concrete, where modular's benefits can be had with the utmost freedom. And we can grow vines on our rock-faced panels.

HARRY WEESE, Architect

Architects today are already relying heavily on mass-produced component parts in design. High standards of design will broaden their use greatly. Undoubtedly this will result in greater economy, and greater over-all unity of design, and will also help achieve for our time an "anonymous architecture" of high standard.

I. M. PEI, Architect

I hope that we tend toward doing good buildings where each one is not an individualistic attempt at being different. I would rather see a street of neat, orderly structures than a street full of the products of 20th Century "geniuses" creating a confused pattern.

GORDON BUNSHAFT, Architect

If the industrialized building is kept negative and impersonal, as is so desirable, never offending and never insisting, then the divers statements of *creative* architecture will not be adding to confusion but will be punctuating a neutral background. At the same time this background may be beautifully neutral, or neutrally beautiful, if it is wisely directed, if the advice of the great teachers of universal principles, such as Gropius, is heeded.

ROBIN BOYD, Architect

Mechanical industry has increased the rate of producing materials and forms preparatory to the erection of buildings. But it has not materially increased the per-man speed of erection. . . .

FREDERICK LEE ACKERMAN, Architect

For sources of quotations see page 282

Although this is an unpleasant idea to many architects, and a disturbing one from the point of view of professional, social, and "biological" individuality, these critics point to the tremendous need for *shelter* and the impossibility of every commission producing a work of great architectural art. The question, "are the so-called esthetics of . . . these manifestations alike?" is a difficult one to answer: good, thoughtful architects admit that it is "puzzling." Is it better to produce a unified, disciplined, but undistinguished city pattern than to try for individuality everywhere? Does such a neutral background help, or harm, the individual burst of undisciplined genius? Can the "beautifully neutral" ever become "neutrally beautiful"? The proponents of a disciplined, unified neutrality have certain facts of social development on their side: the great increase in population, present and anticipated; the resultant huge demand for buildings; the fairly limited size of the practicing architectural profession and its slow curve of growth and renewal through the schools. Is it physically possible, they can ask, to plan every new building so that it will be an individual work of art? Should not architectural offices study the possibilities of MODULAR ASSEMBLY, rather than allow the nonprofessional suppliers to fill the obvious needs?

These are the three main points of view: MODULAR ASSEMBLY will produce sterile architecture; it can produce beautiful architecture; it should provide a neutral background for great architecture. That it is with us, that it is a concept which must be understood, that it will inevitably be used to an increasing degree, the pages of this issue seem to prove beyond doubt.

Thoracic Clinic in Boston (The Architects Collaborative, Architects) is a recent example of co-ordinated design resulting from Walter Gropius's long-continuing concern with industrialized construction methods and assembly of parts. Photo: Joseph W. Molitor

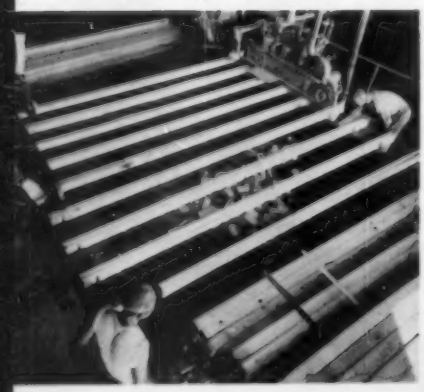
PREFABRICATION

the dream of factory assembly

Prefabrication of buildings has been a dream of the American economy for a number of decades—in fact, in isolated examples it can be traced back to the boatload of parts brought from England for assembly into a house on Cape Ann in 1624, and the prefabricated building sections shipped from New York and Chicago to California's gold-rush market of 1848-49. It has seemed obvious to many that removal of construction assembly from the haphazard conditions of the job site to a controlled factory environment should result in production efficiency. However, full prefabrication—total building in the factory and total delivery from factory to site—has run into almost insuperable difficulties (marketing, shipping, fitting to site conditions, opposition of codes, crafts and local suppliers, consumer prejudices, to name a few) and many brave attempts have failed. On the other hand, almost total prefabrication of *parts* for job assembly has been proved practicable and profitable by a number of persistent manufacturers—some of whom, it is pertinent to note, have employed top-design architectural talent for their prototypes. A reasonably significant proportion (7 to 8 percent) of new residential construction is now by "prefab" methods. Recently, the aggressive entry of several large, national fabricators into the nonresidential fields has reached a volume that has alarmed the independent professional designers and made competitive producers take a second look at the market.

These moves are significant for the principle of MODULAR

Courtesy: Stran-Steel Corp.



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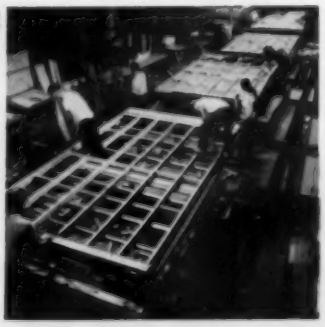

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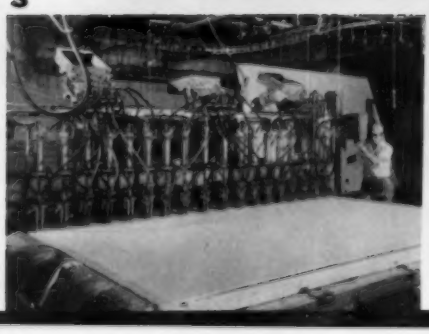

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Courtesy: Butler Mfg. Co.

Modular construction methods are finding wide application in all sections of the building industry; as illustrated by prefabricated service station (above), *warehouse* (acrosspage), *and classroom* (below).

Courtesy: Structo Schools Corp.

ASSEMBLY, no matter how or by what prejudices they are evaluated. The technical appeal of the "prefabricated" house or school or church (ignoring for this discussion other claimed advantages such as financing, firm prices, etc.) is that it promises a quick and economical assembly of standardized parts. This means, technically, that (a) the major component parts are the proprietary products of the "prefabricator," and can be made to whatever jig, template, and modular sizes the manufacturer chooses, and (b) assembly methods, for the fitting-together that has to be done on the site, can be carefully preplanned for industrylike efficiency. Implicit in these two technical facts are disadvantages, in elimination of any selection and open-market purchase of components; as well as advantages, in preplanned and smoothly fitting assembly. It would seem that MODULAR ASSEMBLY—assembly of *nonproprietary* products from *various* sources—might eliminate the disadvantages of proprietary prefabrication, by giving greater choice and design freedom; and at the same time approach the advantages of rapid assembly. This will be true, however, *only when* enough separately produced, open-market products are fully co-ordinated as to modular sizes and as to jointing details.

If this is an ideal, it is one that may never be fully realized. Wide adoption of Modular Measure principles would make the sizing possible, but assembly-joint methods will always remain very largely a matter of individual experiment, development, patent, and promotion—and here is where the "prefabricator" has a great advantage. There would, however, seem to be much more study that could be made on industrywide bases around that difficult "J" factor—"the joint, the key to the whole modular process." If details cannot be standardized, perhaps dimensions, allowances, tolerances, can be, to a greater extent than now—and thus the degree of full MODULAR ASSEMBLY increased.

Assembly line for the manufacture of prefabricated homes: Double-end tenoner (1) *prepares lumber for assembly line. Pieces are placed in metal jigs* (2) *until tightly bonded. Nailing machine* (3) *reinforces bond. Window, door openings are cut by routing machine* (4). *Wall sections are mechanically turned over for application of insulation; installation of preassembled windows, doors. Bonding, nailing of exterior surfacing completes stressed-skin construction. Numbered parts are brought to trailer* (5) *in proper sequence. Prefab residence* (6) *designed by Charles M. Goodman.* Photos: courtesy of National Homes Corp.

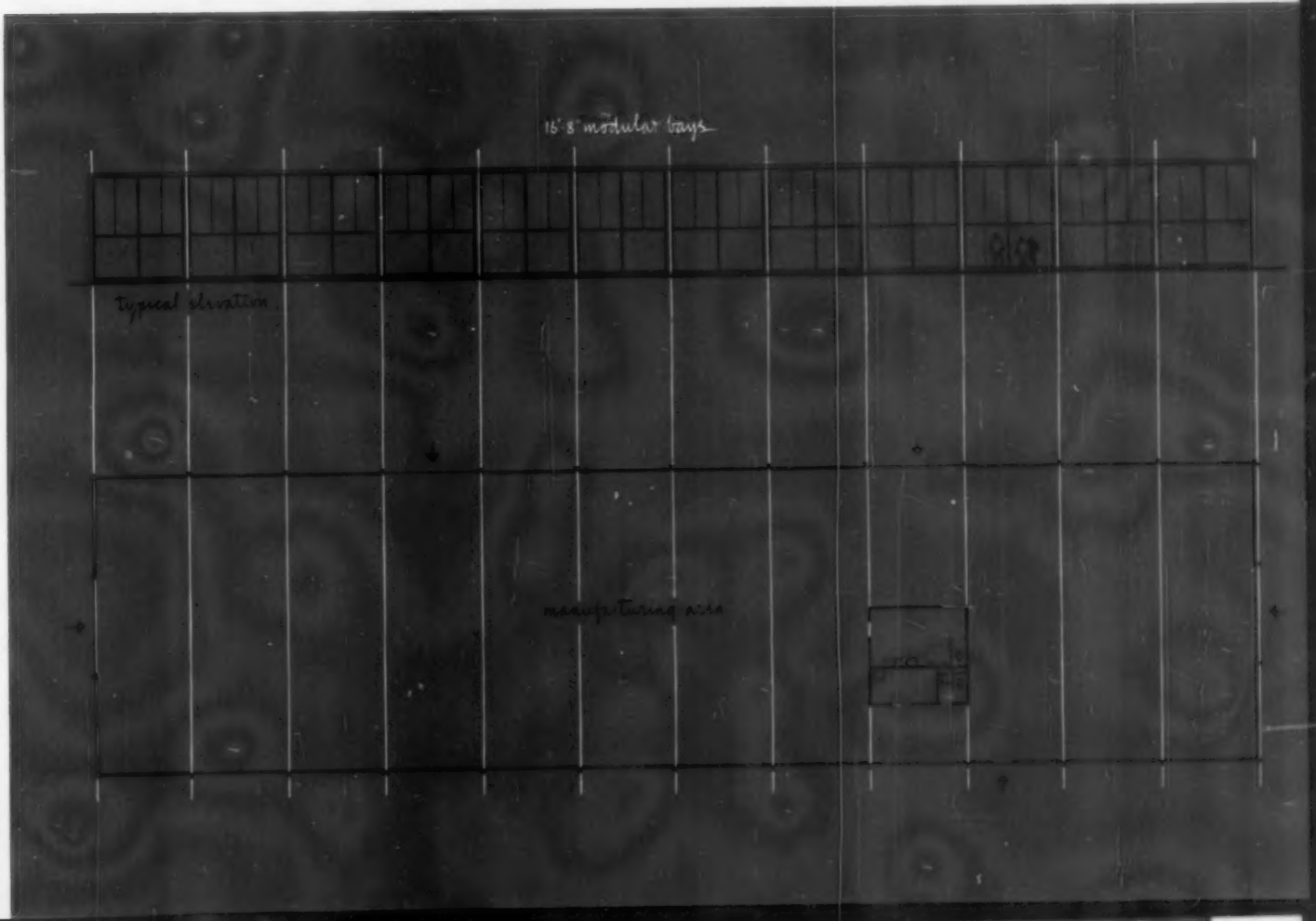
5

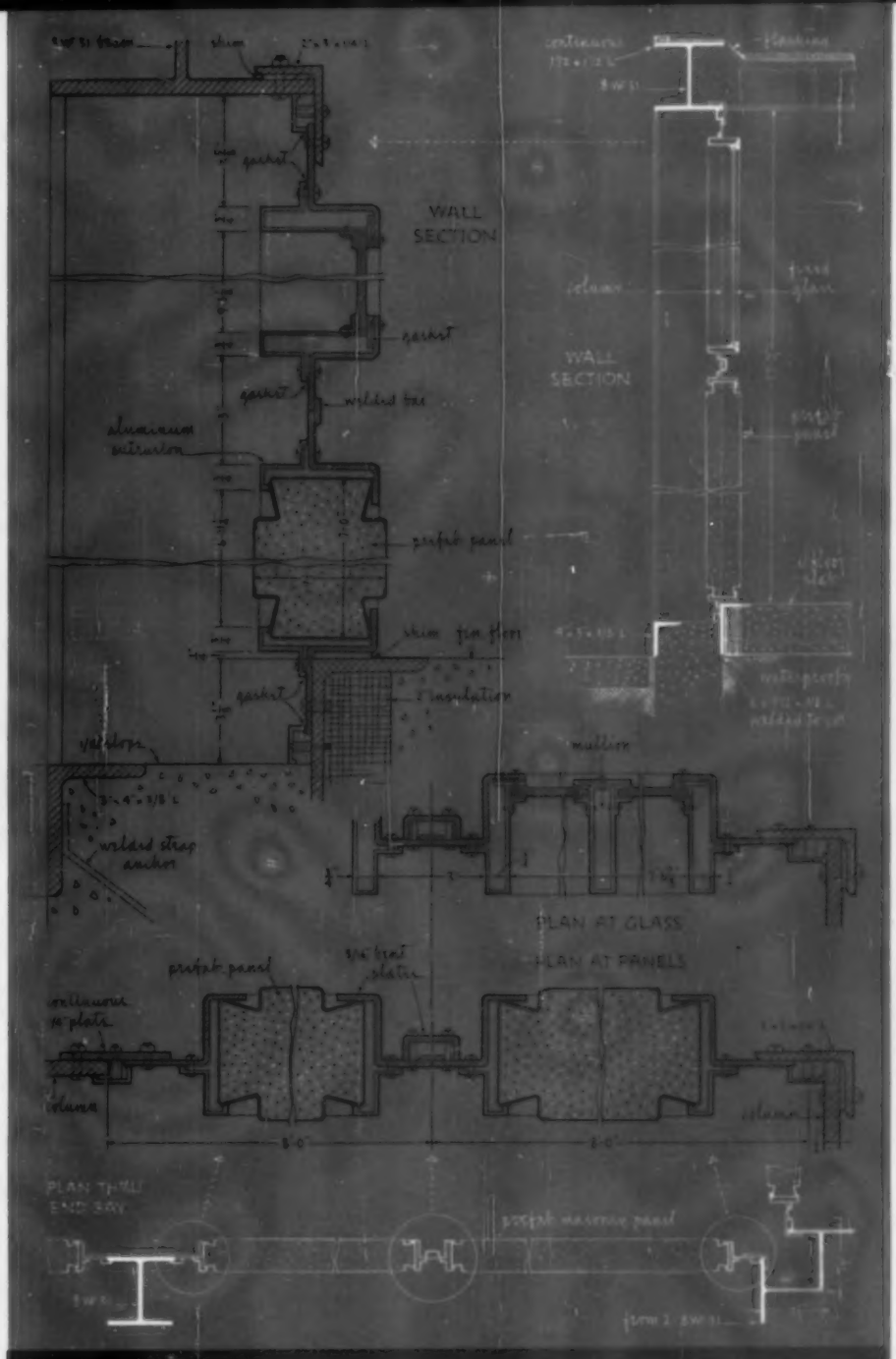
6

factory built of its own prefab parts

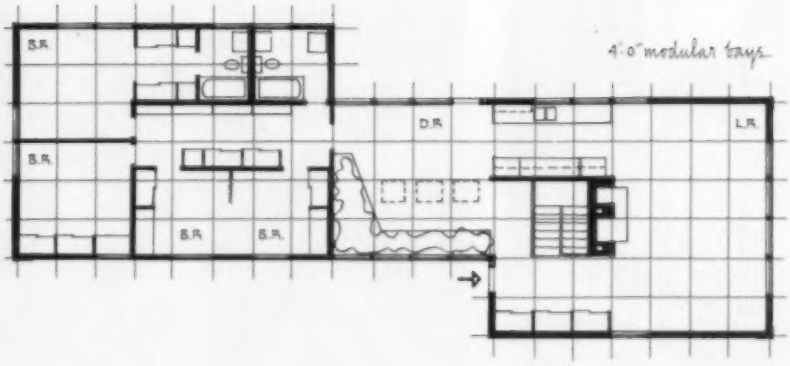
This building serves two major purposes: first, it provides efficient and pleasant production space for the manufacture of lightweight building panels; second, it demonstrates the design possibilities, the flexibility for future expansion, the versatility and economy of its own prefab panel system. The "Tecfab" panel—a unit measuring 8'x8'x4" *(details overpage)*—may be used for complete wall, interior partition, floor, and roof installations for commercial, industrial, and residential use. Two alternate designs permit the joining of panels for an all-masonry exterior or, as in this factory, for a building which exposes its structural members. A coat of vermilion paint further accents the modular rhythm of this structural frame, the only element of the building requiring paint protection. Sheets of heat-absorbing glass are held in place by alumium extrusions. Charles M. Goodman Associates were Architects; Milton A. Gurewitz, Associate Structural Engineer; Tecfab, Inc., General Contractor.

Photos: Robert C. Lautman




WALL SECTION
WALL SECTION
gasket
gasket
gasket
welded ties
aluminum extrusion
precast panel
shim
gasket
insulation
weldplate
weld strap anchor
mullion
PLAN AT GLASS
PLAN AT PANELS
precast panel
angle plate
PLAN THRU END BAY
precast masonry panel

architect proves his own prefab system



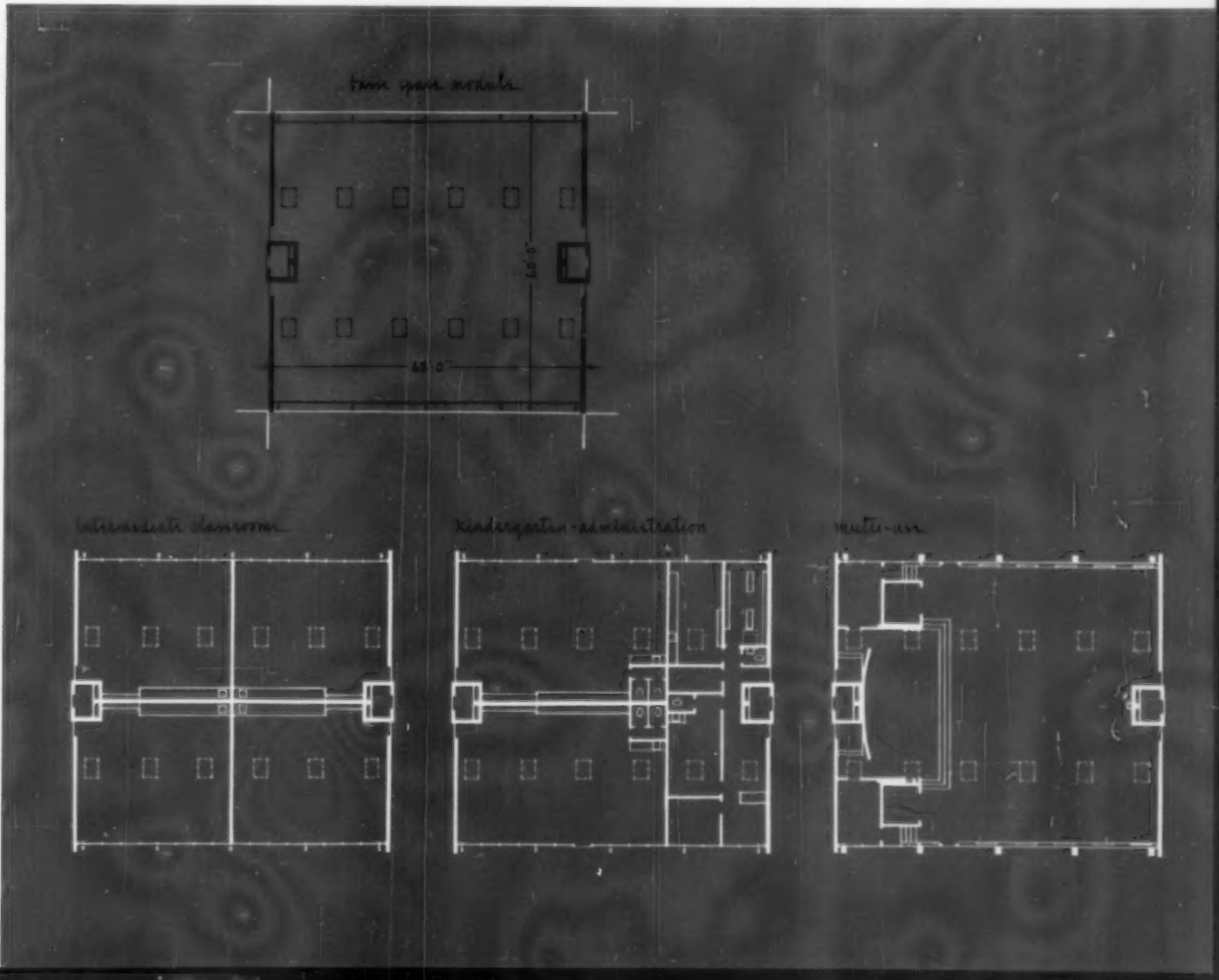
The large-scale production of the well designed, spacious yet economical house has long been the aim of Architect Carl Koch. "From the design point of view," he writes, "we were well aware that repetitive building would lower the cost of construction." Having proved this to his own satisfaction, but unable to interest local builders, Koch founded his own building firm in 1954. Since then, Techbuilt Inc. has grown as a national distributor of prefabricated parts and equipment *and* as a planning service for franchised builders as well as for individuals building their own houses. All of the designs are based on a 4-ft floor module. Wall, floor, and ceiling panels, as well as doors and windows, are precut to this modular size. One of the most recent applications of these modular parts is this two-level residence. The basic structure is wood, post-and-beam framing. Modular dimensioning carries also into the interior of the house where storage units are again on a 4-ft interval.

Photos: courtesy of Better Homes & Gardens

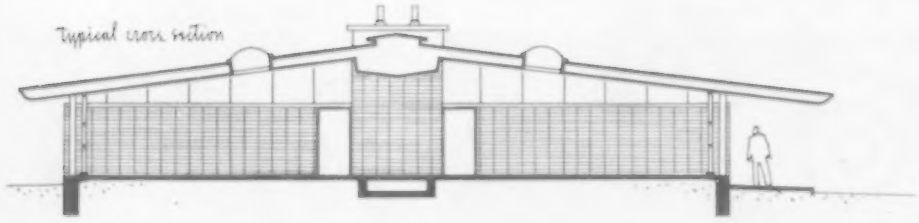
the basic space module: a concept

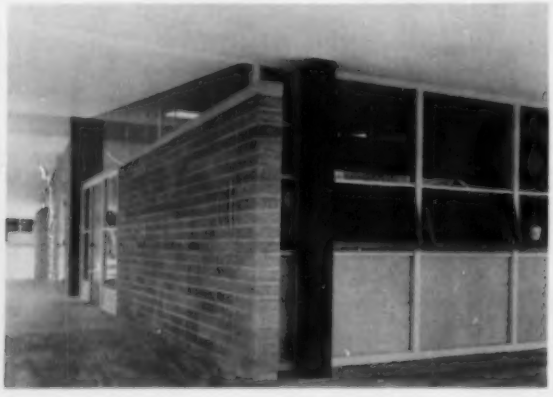
Architect Ernest J. Kump, long a leader in school-building design, has now developed a concept—the Basic Space Module—which he has described in three recently copyrighted analyses. Conceived to help answer the pressing problem of providing "more schools, with a higher standard of quality, for more students, for less money," the space module is, in essence, a three-dimensional building unit (complete with lighting, heating, and ventilating elements) that may be variously subdivided and combined, to provide answers to almost any school-planning problem. When linked, joined, or organized campus fashion, Kump finds that the resulting architecture—like anything in nature that is made up of a multiplication and joining of like, self-energizing cells—has exceptional validity and organic unity. Further, he finds, the provision of proper space environments for education on a volume basis results in impressive economies and time saving, while retaining freedom and individuality for educational space planning. While the theory almost certainly invites a high degree of prefabrication of parts, the space unit is the main concern here, rather than the materials used or manner of construction.

For elementary school planning, Kump finds ideal a basic building unit (or space module) 60′ x 68′ in area—with clear, unobstructed span within and containing its own control systems, including warm-air unit heating plants. By assembling these building modules into schools, a few advantages found are: construction cost savings up to 20 percent; reduction of as much as 30 percent of time required for planning, design, and construction; savings in architectural and engineering fees; higher quality of school and more space per student for less money; minimum cost for additions for expansion. On the following pages, we show one recently completed elementary school by the Kump office that applies the principle.



the basic space module: an application

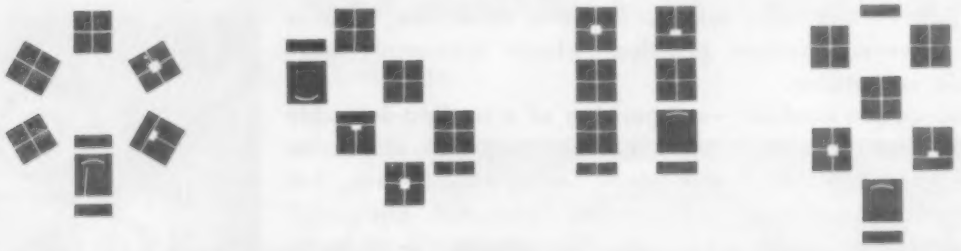


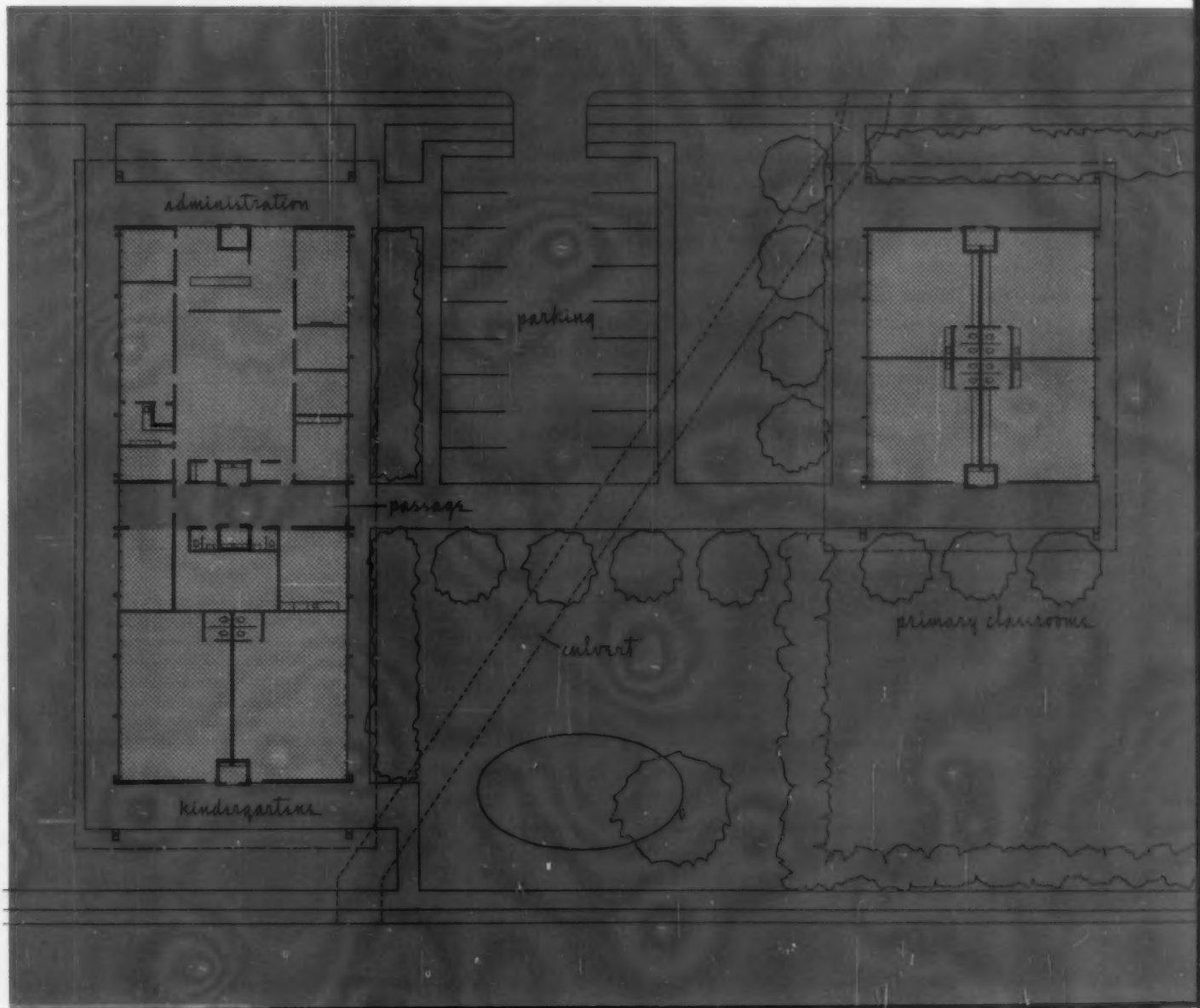


Modular structure (steel frame); modular heating distribution; modular plastic skylights, for lighting interior space. Total cost came to $12 per sq. ft. Notice clear articulation of exposed steel frame from enclosing curtain walls of glass and asbestos-cement-surfaced insulating-board panels. Unit warm-air heaters occur in brick-enclosed end units. Photos: Pirkle Jones

First example on the San Francisco Peninsula of Basic Space Module design is the Edgemont Elementary School for the San Bruno Park School District; The Office of Ernest J. Kump, Architects, and Walter L. Dickey, Structural Engineer. The program was unusual, in that the school was to contain not only four primary classrooms (which will make use of multi-use facilities in an older, neighboring school building) and two kindergartens, but also offices of the District Superintendent.

Three of the 60'x68' Basic Space Modules constitute the two main elements, organized at either side of a 10-ft. culvert that crosses the property diagonally. The smaller element (a single module) houses the four primary classrooms, each with its toilet facilities; the larger element (two space modules joined by a passage) contains the two kindergartens at the eastern end and District Administration offices in the remainder of the enclosure. Should the latter absorb the kindergarten space (which is contemplated when additional schools are built), remodeling will be a simple matter, since no partitions are loadbearing, and since heating, ventilating, and lighting facilities are completely integrated with the structure (*section*). Regardless of where a partition is located or relocated, the systems remain balanced, without modification. Sketches below suggest just a few of the numberless patterns of school layouts that are possible with Basic Space Module design.





STRUCTURE/USE MODULES

the rhythmic skeleton for assembly

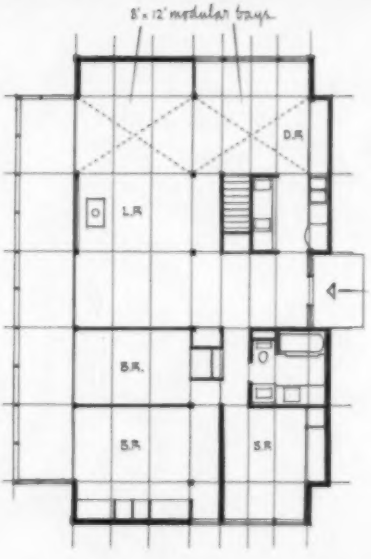
There are many impelling reasons for the adoption of a repetitive unit of measure—a *module*. The most obvious, perhaps, is standardization of manufactured parts (*see* Prefabrication, *page 122, and* Modular Measure, *page 164*). At the other extreme is the esthetic desire to produce rhythm and unity; along with Golden Rules and Golden Sections, from Vitruvius to Le Corbusier, a rhythmic pattern has been sought. Between these two rational extremes, however, various practical-esthetic arguments have gained wide acceptance.

The "human-use module"—a repetition of a median-desirable office width, hospital-room dimension, laboratory unit, classroom size is one. The individual may plead for special desires, but social-use architecture cannot often be that personal. The standard structural unit is the other strong argument for a large-dimension module. If it can be related to a use module, so much the better. But, in itself, the desirable dimension for a beam span, plank deflection limit, reinforcing size, dome, arch, folded plate or parabaloid reach, is a defensible module. Structural members all the same length, forms that can be stripped and re-used, standardized connections, result in economies as well as visual rhythms. Within this argument, of course, almost all of the recent plastic developments are comfortable: Candela's repeated umbrella forms, Yamasaki's repeated folded-plate roofs —even the repeated units of the dymaxion structures of Fuller or the space frame of Kahn.

Clearly, the repetitive structural module not only produces unity but also can, in careless hands, result in monotony. It would seem most important for the designer to provide foils: the curving stair of the Zurich Aluminum Industries building; the variety of open-view and closed-view aspects of the Grossman house; the landscaping of the Odell school. Color, introduction of decorated surfaces, sculptural forms and rhythmic freedom seem the keys to what Neutra calls the "more subtle design which must be added to the mere putting together."

***Combinations* of structural modules offer a great variety, which few designers have explored in recent years. Grosvenor Atterbury once pointed out that while a single module of 4-ft requires that "your walls must, of course, always be multiples of 4-ft," the addition of a 3-ft unit to the "scale" allows "any aliquot number of feet from 3 to infinity, excepting only 5-ft."**

The most important conclusion to draw at this point, however, seems to be that structural-use modules can be co-ordinated with human-use modules, and adapted to prefabrication techniques and the practical considerations of Modular Measure; the concept of MODULAR ASSEMBLY then approaches reality.



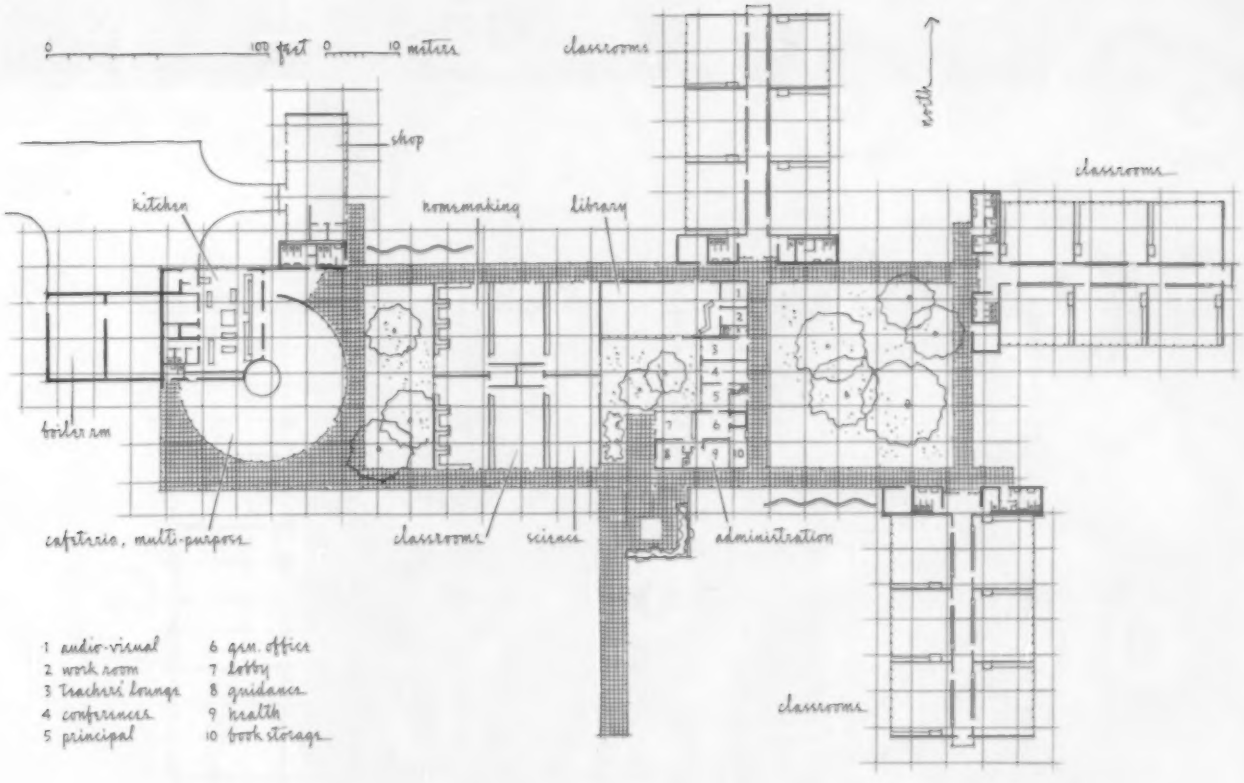
"The house is designed on an 8' x 12' structural bay," comments George Matsumoto, Architect for this well known house in Raleigh, North Carolina, that he built for his own family. "Studs are approximately 2 ft o.c. with all exterior panels 4-ft wide, and interior panels 2-ft wide.... The 4-ft grid works well with the 16-in. joist and block spacings.... Floors, roof, and walls are finished with 4' x 8' plywood sheathing. The main idea was to eliminate excess tooling and to use materials as they come from the factory."

Photo: Joseph W. Molitor

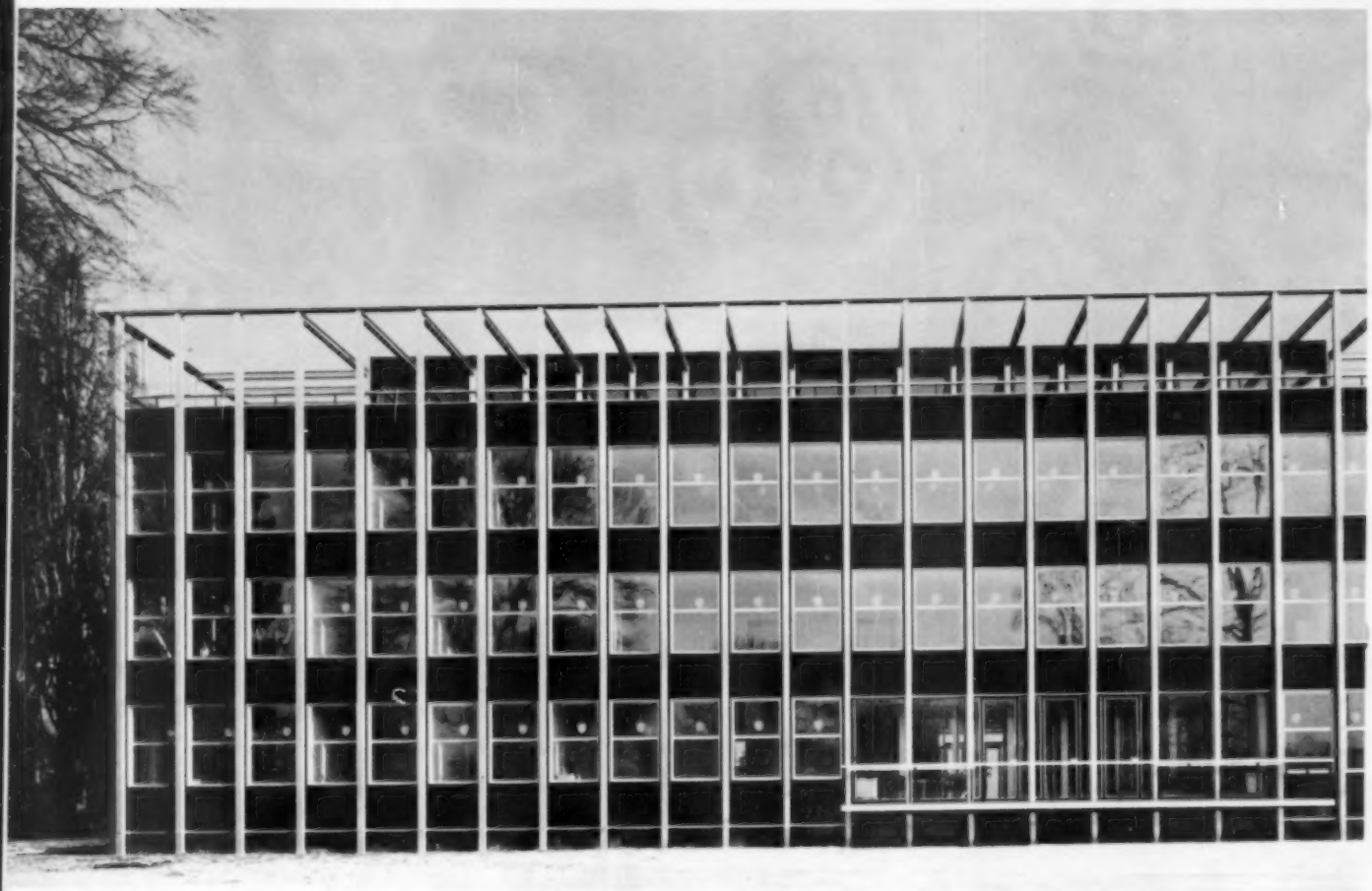
almost totally shop fabricated

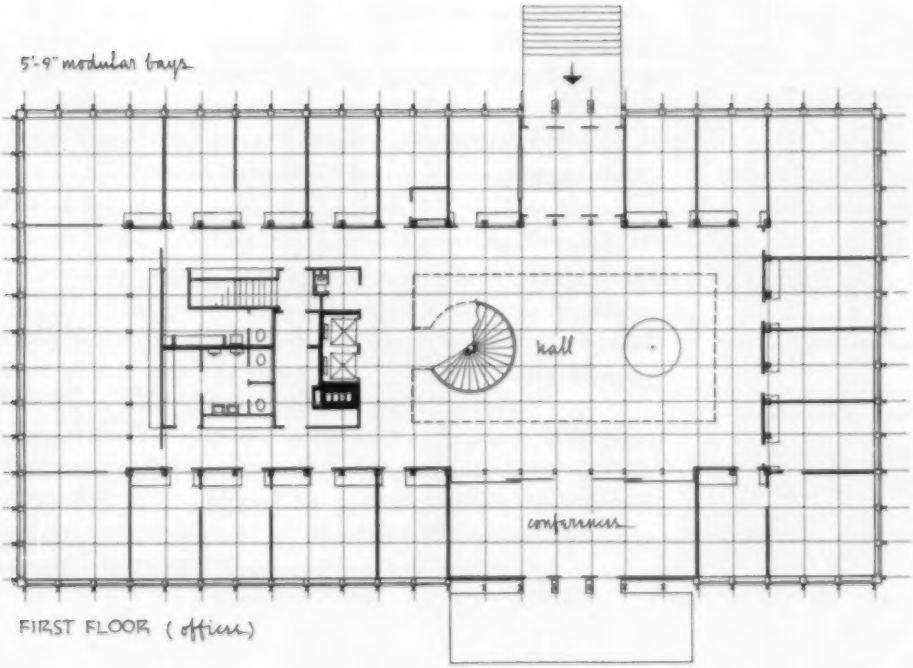
The Wilson Junior High School, Mecklenburg County, North Carolina, was designed by A. G. Odell, Jr. & Associates (MAY 1957 P/A). *Almost totally shop-fabricated, structure consists of 4-in.-square welded-steel tubing columns and welded box beams. Column spacing is 8'-4" o.c., and sash, lighting fixtures, lockers, purlins, 1-ft-wide insulated metal wall panels and the wider porcelain-enamel spandrel panels; all follow the basic module.*

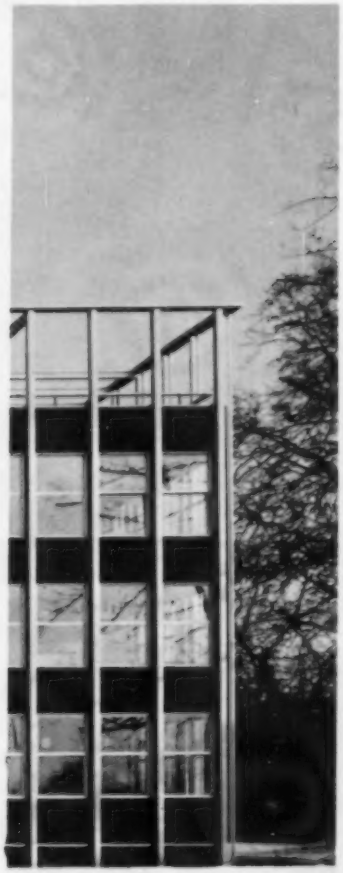
Photos: Joseph W. Molitor
Southeastern Construction Co.



structure/use module abroad







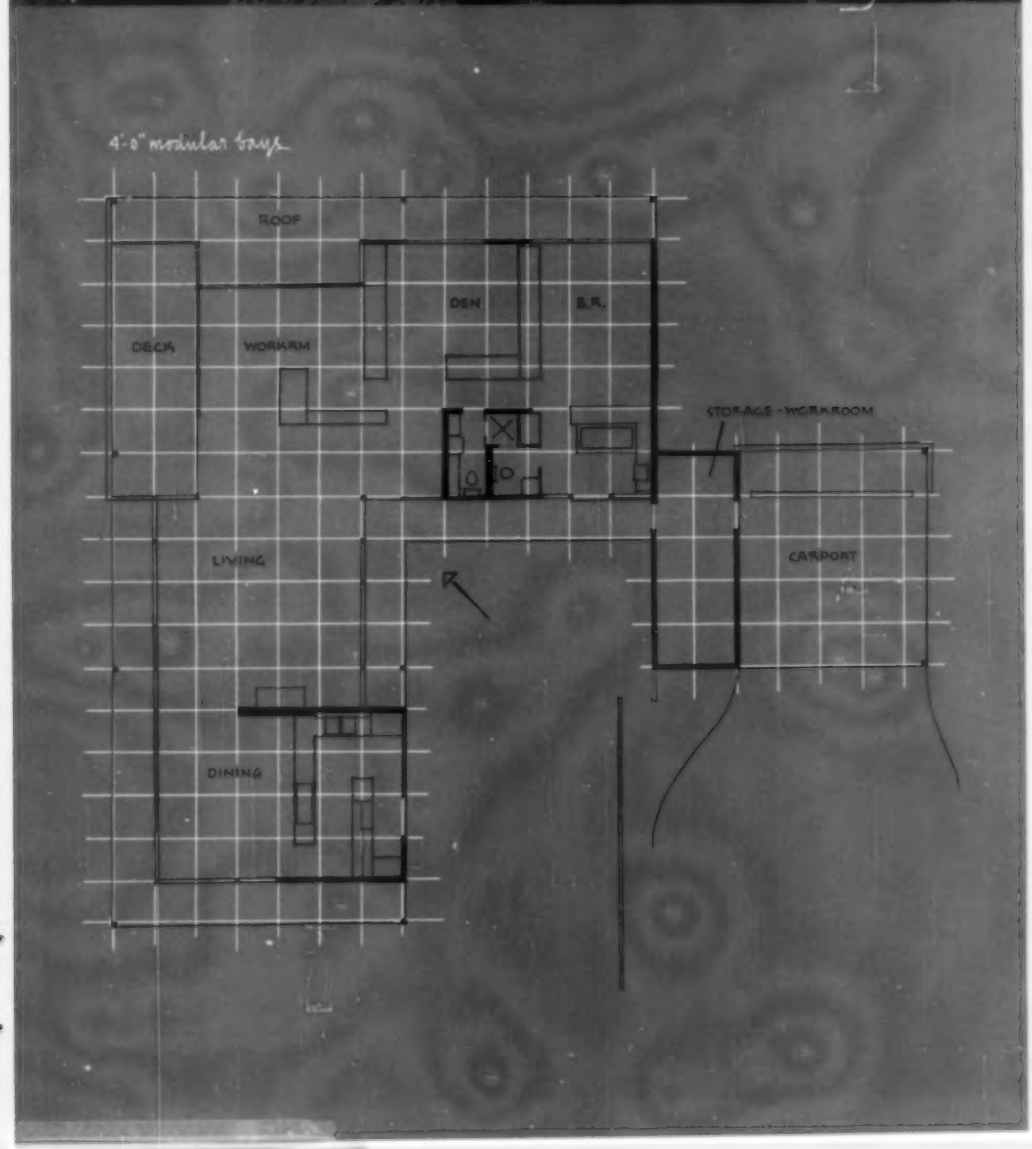
For Zurich, Switzerland, this building marks an important departure since it is the first metal-clad office building in the city, and the first new construction on the famous lake front. Wherever practical, aluminum was to be employed in the construction of this administration building for the Aluminum Industry of Zurich. Aluminum sheathing was applied over the asbestos-insulated steel skeleton. Vertical sheathing as well as spandrel panels were anode-oxidized, and spandrels stained dark brown. Structural members are on 5′-9″ centers, providing a workable module for the double-glazed vertically sliding windows, and giving an 11-ft clear width to the smaller office units. Rooms are arranged around a lofty central hall and are accessible from three tiers of galleries. In contrast to the quiet color and structural rhythm of the exterior, a circular, red-carpeted stairway rises from the blue-tile floor of the hall. This building element and other thoughtful interior details impart to this building an individuality and spirit often lacking in today's modular architecture. Prof. h.c. Hans Hofmann, Architect.

Photos: Peter Grunert, Zurich

4-ft module—no limitation on design

To gain enough level area for a large one-story house (3120 sq ft), as well as a garden, the building was brought far forward to project over the steeply sloping site. A series of steel posts in tripod arrangement support the entire structure, and an L-shaped block foundation serves as retaining wall for the garden. The upper structure is equally light and unobtrusive, to interfere as little as possible with the far-reaching views of ocean and mountains. Vertical supports are located at the perimeter of the structure to afford freedom and flexibility in the placement of exterior walls and interior partitions.

Exterior walls are entirely composed of panels 4 ft wide, in alignment with the regular floor module. Panels are either glass or a nontransparent material, such as hardboard and redwood for the exterior face and plastic-finished panels or walnut plywood on the interior face. Floor and roof framing are standard joist construction. Suspended from the underside of the floor are two forced-air units which also circulate cool air during the summer. Most of the interior partitions are movable storage units, 7 ft high, supported on chrome-steel legs. The ceiling is surfaced with acoustical plaster; the flooring is of magnesite terrazzo; travertine, in the rough, covers the screen wall adjoining the fireplace. Colors, both interior and exterior, are black, white, aqua, yellow, and gray. Redwood was stained black and walnut plywood was given a clear lacquer finish. Colors which have been added by means of textiles are blue, purple, and orange. Exterior and interior lighting fixtures were made of perforated-metal cylinders. House, landscaping, furniture, lighting fixtures, and some of the textiles and rugs were designed by Greta Magnusson Grossman.



House in Beverly Hills, California, is situated on high knoll at top of ¾ acre site. On entering garden gate—operated by remote control—distant hills and ocean are visible through house. Mullions on the 4-ft module hold glass or solid filler panels. Glass areas may be shielded by window shades in gray, white, and yellow. Photos: John Hartley

House is occupied by a couple. Plan, is open for enjoyment of views from all parts of the house. Living room takes in dining area (below), *as well as studio* (left) *at opposite end.*

Counter (top left) *separates kitchen from dining area. A 7-ft cabinet partially closes off studio* (above) *from living room. Bedroom and bath* (left) *are one large room, divided only by a low storage partition.*

CURTAIN WALLS

the rage for panel assemblies

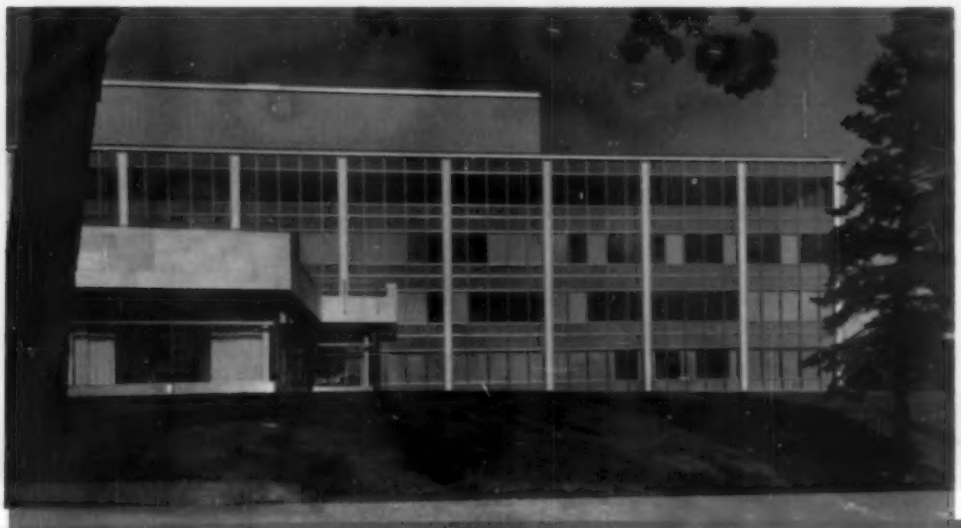
The panel curtain wall in its current widespread manifestation is based on many concepts in addition to the one of co-ordinated assembly. "The tendency toward a functional distinction between skeleton and skin has had a pronounced effect on the development of all building material," as James M. Fitch has pointed out, and the increasing design of wall as "curtain" has led to many new materials and combinations of materials in which the functions of weather protection, openness or its opposite, transparency or the reverse, and visual effect have been the controlling factors (within limitations imposed by building codes). This concept of the *function* of the curtain wall led easily to the belief, expressed by Talbot Hamlin in *Forms and Functions of Twentieth Century Architecture*, that "two results of the fact that these walls carry no weight should immediately be obvious: the unprecedented freedom in the choice of materials . . . and a consequent freedom in their design." Early panel-curtain-wall users soon found that choice of materials and their design as wall units was not at all free, but had to be most careful; and that many new criteria (transmission factors, degree of deterioration, tolerances, movement, wind resistance) had to be considered. Most important, perhaps, has been that Old Devil—the joint.

If one considers the panel curtain wall as a technical phenomenon rather than a functional one, it becomes of major significance as another step toward full MODULAR ASSEMBLY. Here *jointing* problems become paramount: the joint as a weak point that must be sealed; and the joint as the key to assembly of wall units—spandrels, windows, mullions, attachments to the structure. Nothing else that has happened in recent years has *forced* the study of assembly problems upon us as has this unprecedented development of the curtain wall from research to cliché in less than a decade. The assembly has taken place before implications were fully understood: "the wide acceptance, all over the world, of curtain-wall buildings will force testing, standardization, and acceptable procedures of fabrication and erection," Harold Sleeper wrote in June 1957 P/A. Perhaps this has its advantages; it *is forcing* a study of these things. But it has also had its disadvantages: the wall has been considered an isolated assembly problem; the development has been so rapid that correlation of the wall with anything but the structure has generally been ignored. Only now are some architects, who see it as more than a fashionable design trick, seriously attempting further correlation with floor and roof assemblies, with ceiling systems, and with partition and fixture elements, as in the insurance office building of Thorshov & Cerny, shown on the following pages.

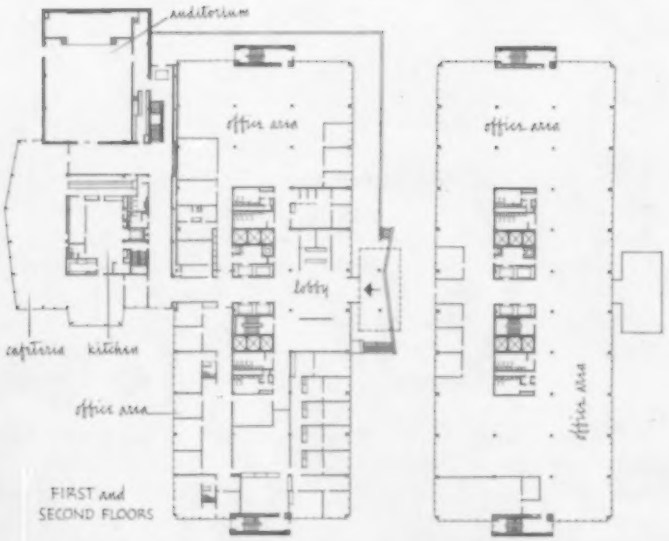
curtain wall reflects office module

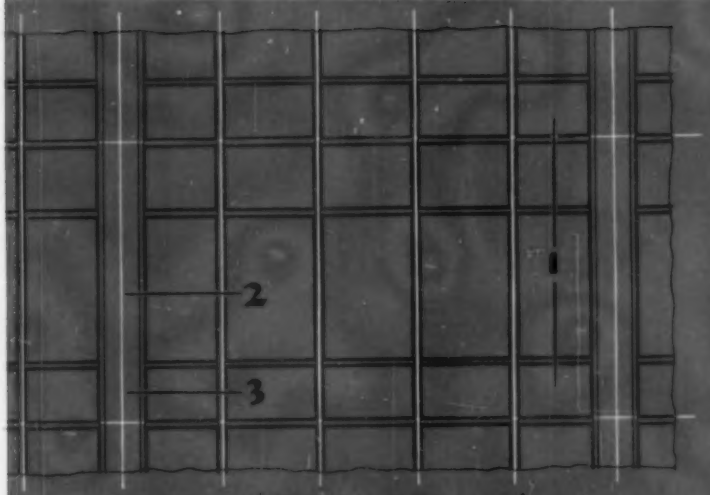
Studies of typical office arrangements pointed to the 4'-8" dimension as an effective repetitive unit for this building. On this module the architects planned partitions, lighting and air-conditioning units, structural bays, and—the most commonly recognized modular element—the curtain wall. The parts which make up the exterior skin are: panels of double-paned, clear glass, and spandrel sections of opaque, tempered glass to which color has been fused on the interior face.

These panels are set into a stainless steel frame; column facings being of Vermont Pearl Marble. Reflective surfaces and colors—subdued grays, greens, and blues—were chosen to mirror and to be consonant with the beautiful lake-front property. The building consists of two major elements, a multistory office unit and a horizontal wing which contains special facilities for personnel and community use. Structurally: foundation and footings are of poured concrete; a bolted-steel frame supports the office wing; concrete joists span the garage portion. Floors are of cellular steel with 2½"-concrete topping and a lightweight-plaster fireproofing for ceilings. Cellular-steel subfloors also serve as raceways for electrical, telephone, and such auxiliary services as intercom and future central dictation. The roof construction is again cellular-steel subflooring with glass insulation and built-up roofing. The Architects for this Home Office of the American Hardware Mutual Insurance Company were Thorshov & Cerny, Inc.; Kenneth R. Whitehead, Project Manager; John G. Rauma, Design Supervisor; John Meyer, Structural Engineer; Ronald Gridley, Mechanical Engineer; Lennard Johnson, Electrical Engineer; A. C. Godward, Consulting Engineer; Johnson, Drake & Piper, Inc., General Contractor.

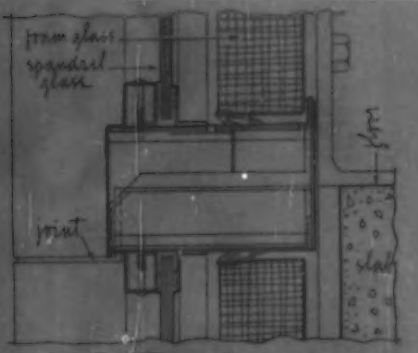


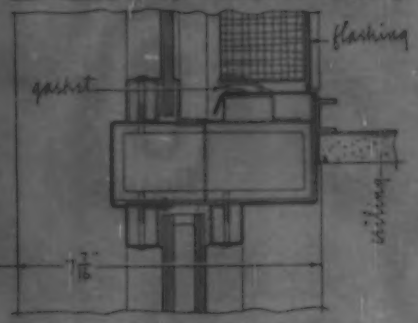
Low horizontal wing (above) *contains cafeteria and private dining room as well as an auditorium for lectures, employe-training sessions, and motion pictures; office block to the right may receive two additional stories in the future. Executive offices* (below) *are paneled in natural walnut, have light-gray carpeting and upholstered pieces in bright colors. Wardrobe and storage cabinets, with glass to ceiling, separate typical offices on the north side* (bottom) *from corridor.* Photos: George Miles Ryan Studios, Inc.

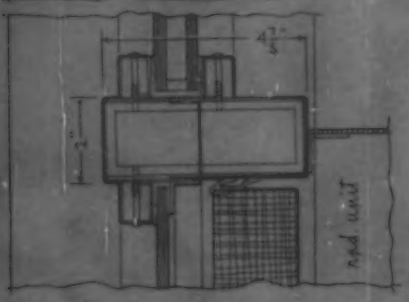




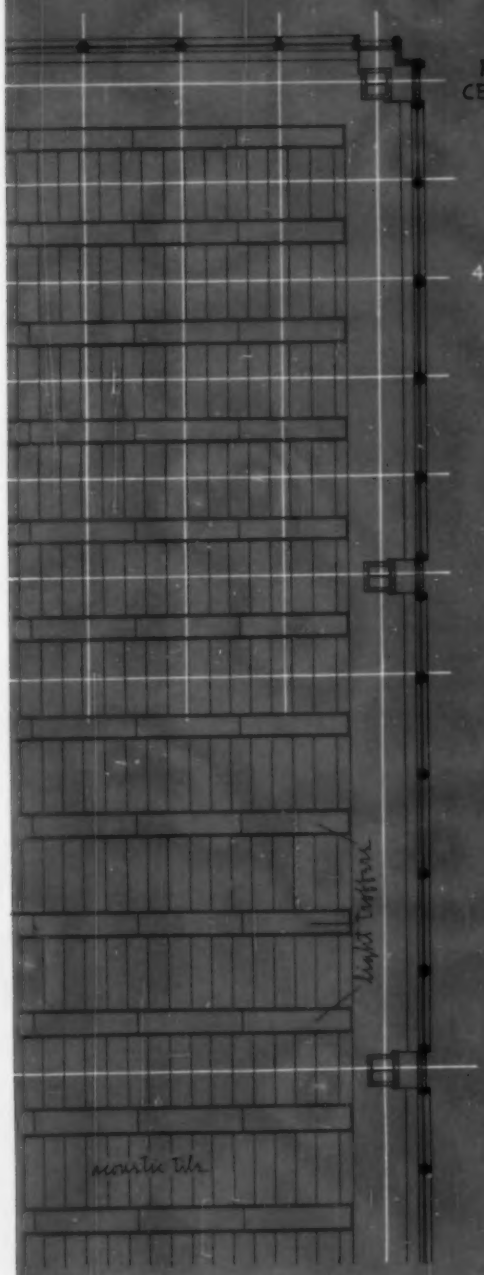
ELEVATION of TYPICAL BAY 1/8" scale



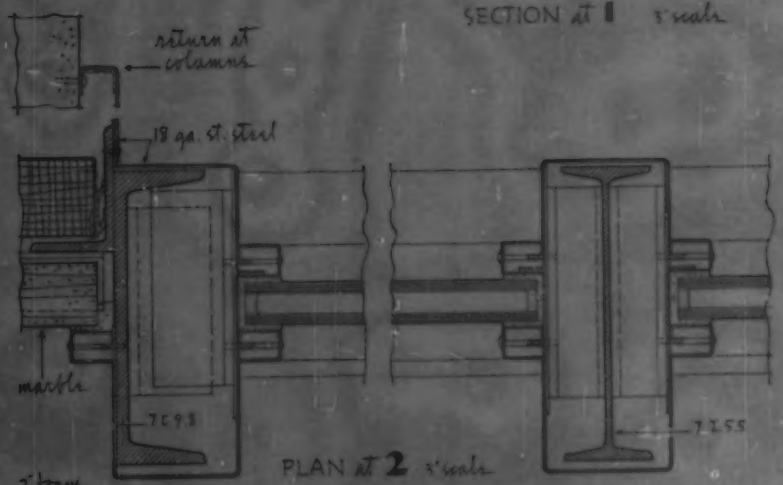




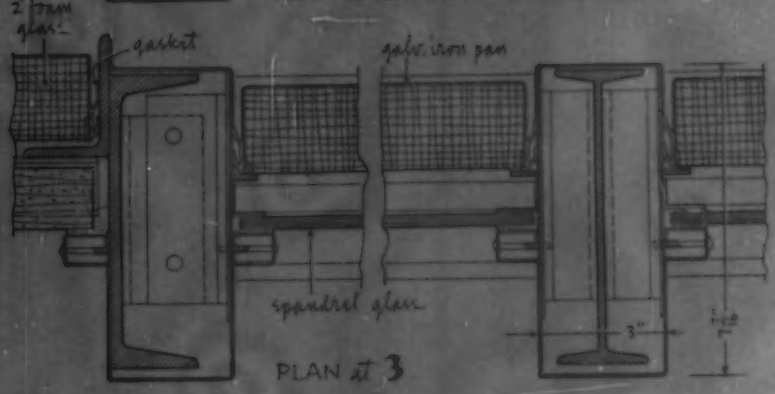
SECTION at 1 3" scale



REFLECTED CEILING PLAN 1/8" scale



PLAN at 2 3" scale



PLAN at 3

curtain wall reflects laboratory module

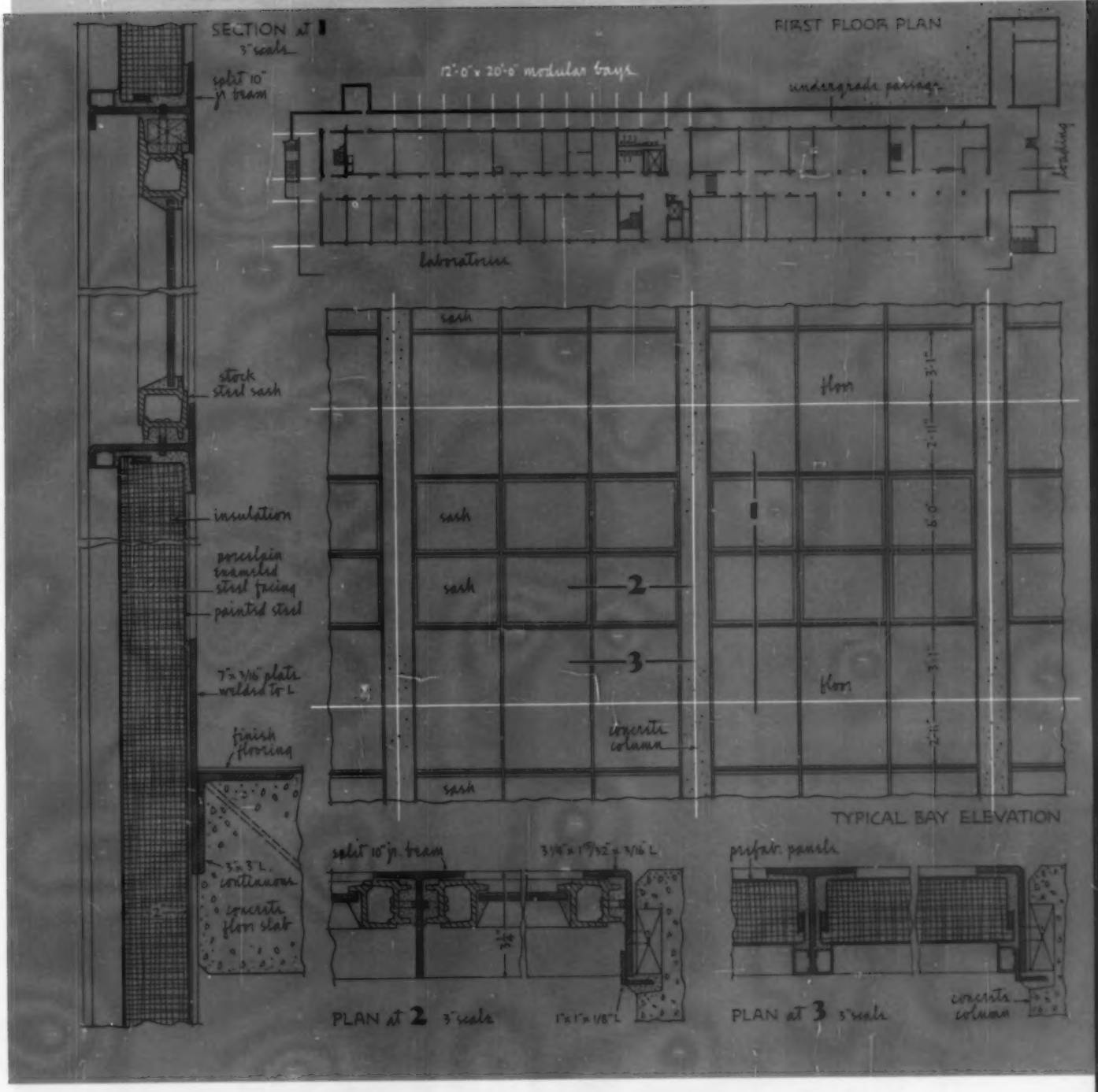
Associated Architects for Josiah Willard Gibbs Research Laboratory for Yale University, New Haven, Connecticut, were Office of Douglas Orr and Paul Schweikher. The reinforced-concrete structure (one-way flat slab on beams), whose column spacing was developed around a basic 12'x20' laboratory module, contains faculty and graduate research labs in the fields of physics and biology. The departments share such common facilities as loading dock, elevators, stairs, machine shop, toilet rooms, etc. Flexible space and ability to adapt the building quickly to changing programs were important design factors. The various service outlets—hot and cold water, gas, distilled water, electricity, etc.—are grouped in vertical risers in each lab bay, on both sides of the central corridor. Movable partitioning consisting of cement-asbestos-surfaced insulating board supported on vertical channels may be set in place or removed in minutes. At present, labs range in size up to six 12'x20' modules.

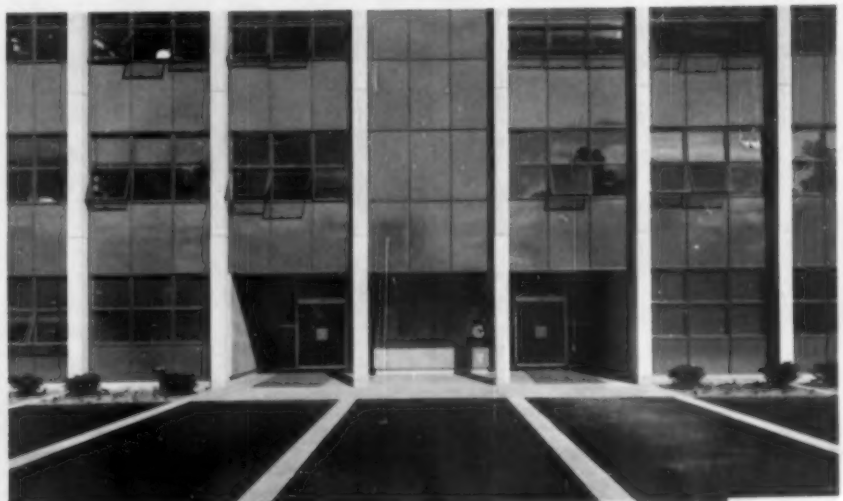
Curtain walls along east and west walls of the building are of steel-framed glass and insulated, enameled-steel panels, with concrete columns left exposed; end walls are marble.

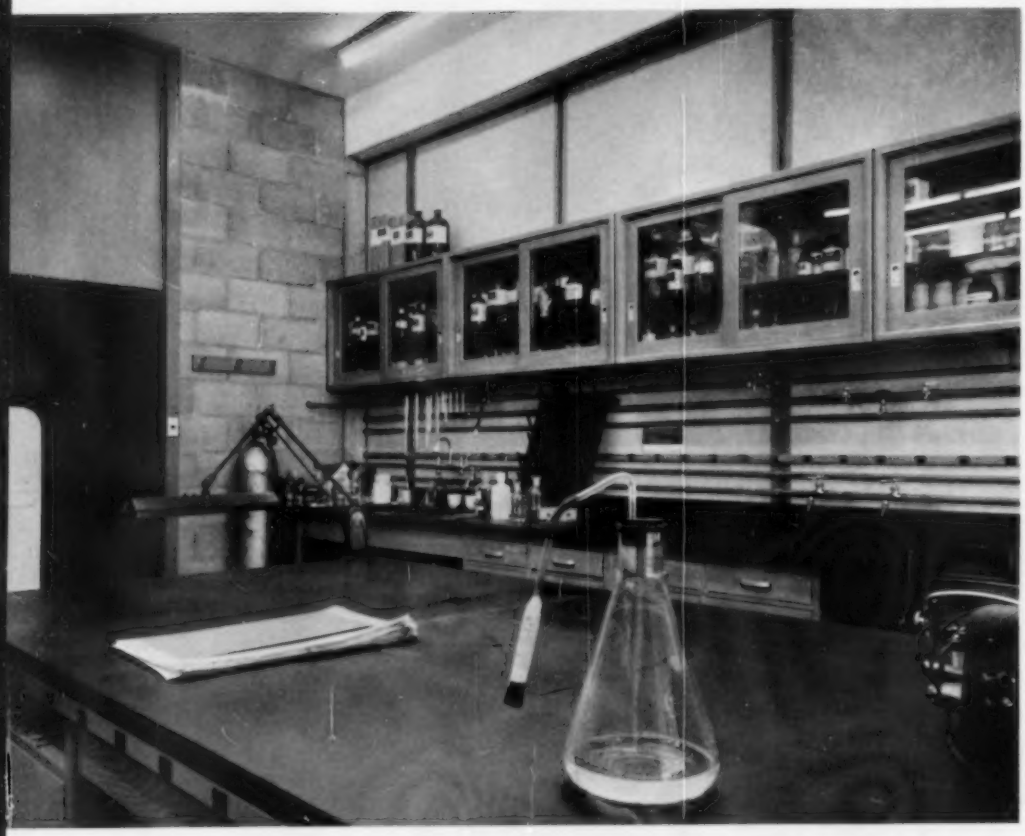
The open gallery surrounding the roof provides a parapet for those conducting experiments on the roof, screens some mechanical equipment, and provides exterior columns for a future sixth floor.

Hot-water fin-tube radiation is served from the university steam plant. Ceiling-mounted fluorescent fixtures are used in laboratories; corridors have incandescent illumination.

Associated in the development of the building were Henry Pfisterer, Structural Engineer; Meyer, Strong & Jones, Mechanical Engineers; George B. H. Macomber, General Contractor.

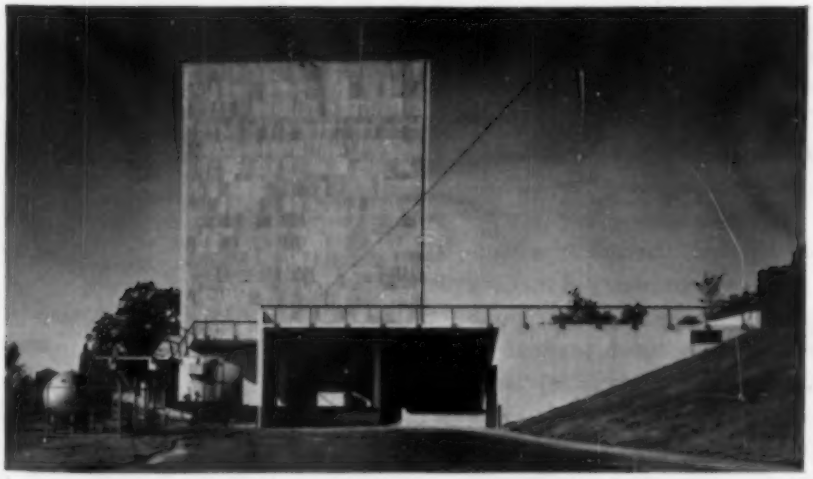

SECTION at 1
3" scale
split 10" jt tram
stock steel sash
insulation
porcelain enameled steel facing
painted steel
7" x 7/16" plate welded to L
finish flooring
3" x 3" L continuous
concrete floor slab
FIRST FLOOR PLAN
12'-0" x 20'-0" modular bays
underground passage
laboratories
sash
floor
concrete column
TYPICAL BAY ELEVATION
split 10" jt. tram
3/16" x 1 9/32" x 7/16" L
PLAN at 2 3" scale
1" x 1" x 1/8" L
prefab. panels
PLAN at 3 3" scale
concrete column





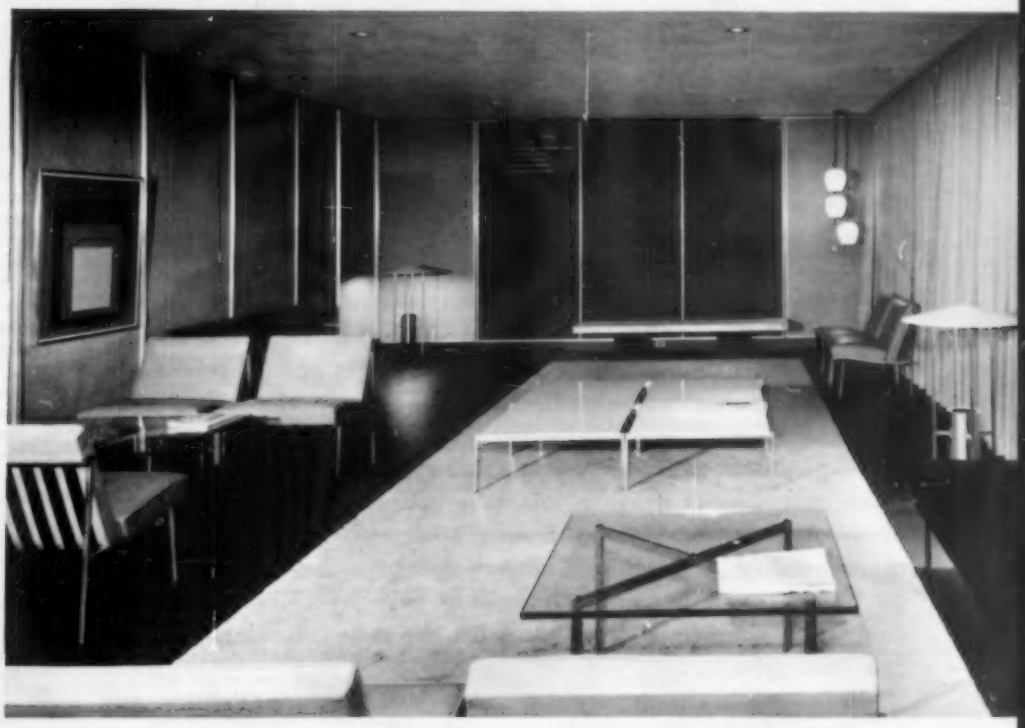
Service lines are potentially available everywhere, from chases that occur in each lab bay on both sides of the corridor. Since they are left exposed, change of service to lab spaces is readily accomplished.

Photos: Louis Reens



At the north end of the building (left *and* above), *are the common-use loading dock and stair to the upper terrace.*

Wall fabric in the memorial lounge (below) *was designed by Anni Albers.*



MODULAR COMPONENTS

units

and systems

for assembly

Mass production of building materials, products, equipment—in general, what might be called the *components* of a modern building—has made possible contemporary structures and their esthetic rationale. We tend to forget how obviously the relationship of new design techniques and assembly-line products goes back to the beginnings of both machine production and "the modern movement" in architecture. Sigfried Giedion, as an example, points out that "The invention of the balloon frame really coincides with the improvement of sawmill machinery as well as with the mass production of nails . . . without machine-made nails it would be economic nonsense." For a long time, however, mass production and machine tooling have not *necessarily* meant either standardization or co-ordination.

Responsibility for the many unco-ordinated, though machine-produced products, may be placed both on industry (seeking individuality of product) and architects (seeking individuality of design). In recent years, two impulses have pushed us toward co-ordination. One has been the absolute need for standardization, at least in an elementary sense (bolt and screw threads, metal gages, industrywide standard structural-steel sections, and so on). The other has been the drive for a universal module through dimensional co-ordination, now called Modular Measure ***(see page 164)*****. While there are degrees of enthusiasm among both architects and producers about Modular Measure in its pure definition, there is now almost no hesitancy about the need—as an elementary industrial production principle — for pushing further standardization and "prefabrication" of components.**

Much of this paradoxical belief in the principle, but disinterest in the particular application (Modular Measure, or the 4-in. increment) is caused by misunderstanding. Some of the basic requirements of dimensional co-ordination, such as the study of *joint* dimensions along with product sizes, become apparent nuisances to the undisciplined or inexperienced user of the system. Many a manufacturer who says he supplies "modular" products, perhaps "exactly 4-ft long," is still unaware that these units do not work in *jointed* multiples on a modular grid. Many others who shy away from modular co-ordination because their products are "nonmodular"—perhaps based on a 3-in., or 8-in., or a 9-in. unit dimension—have overlooked the fact that these sizes do co-ordinate with the 4-in. increment at certain multiples.

As factors in the apparent trend to MODULAR ASSEMBLY, any product which will co-ordinate with other products is impor-

Modular dimensioning is basically a very simple idea; but as is so often the case, the simplest of concepts presents the greatest difficulty for those seeking to gain acceptance.

For this reason, the manufacturer and association members of Producers' Council have willingly contributed time, money, and talent to the missionary work that has so ably been carried on in the past. We recognize that universal adoption of the modular dimensioning standards can bring about some very desirable changes in design, construction, and manufacturing activities. It has been the experience of my firm in the production of modular interior partitions that a set of architect's modular drawings saves approximately 20% in our engineering detailing and listing time alone. Other manufacturers can site a similar example of costs savings.

Such an acceptance of this simple principle, already in use in many manufacturing industries, could only mean benefits for everyone involved in construction; a broadened building market.

Non-modular building is expensive, illogical, and inefficient. The building industry is in competition with hundreds of other industries for consumer dollars. The competition grows more intense all the time. Simply from the standpoint of dollars and cents, the building industry must seek constantly to reach the ultimate goal—universal acceptance and use of Modular Measure. It cannot afford not to.

It is my feeling—and one generally shared by our members—that the universal adoption of modular standards holds perhaps as much promise for this industry as automation does for say—— the automotive industry.

FRED M. HAUSERMAN, President
Producers' Council, Inc.
President
The E. F. Hauserman Co.

The reduction and eventual elimination of unco-ordinated dimensioning continues to constitute one of the most important progressive movements in the construction industry and deserves the full co-operation of owners, manufacturers, architects, general contractors and subcontractors, builders and labor organizations.

H. DORN STEWART, First Vice-President
Producers' Council, Inc.
Director
Modular Building Standards Association
Marketing Manager
Floor Division, Armstrong Cork Company

Architects are now specifying architectural units which provide illumination, acoustical devices, air distribution, and other services located in a single suspended ceiling, which may also be integrated with movable partitioning on

the ceiling module. The lighting industry is a late-comer to this trend toward integration. When fluorescent lamps were introduced . . . conformation meant trouble for lighting-equipment makers attempting to go along with the modular trend. That was because a lamp on a 4-in. module is enclosed in a unit of lighting equipment . . . where absolute modularity is required it becomes necessary to supply end caps with a knockout piece, so that lamp holders can be butted tightly. Such problems of assembly do not apply to acoustical baffles found on many multipurpose suspended ceilings of light . . . modularity can be basic to the product. Where partitioning is planned on a Modular Measure, partitions can be integrated into the suspended ceiling at four-foot multipliers as space needs may require. Modularity is in the interest of economy because: it allows one building product to provide several services (the baffle, as example); such a ceiling may be installed by one building trade; all integrated units are planned at the source (factory) for modular installation.

T. D. WAKEFIELD, Secretary
Producers' Council, Inc.
Executive Vice-President
The Wakefield Company

tant, even though Modular-Measure principles may not be obeyed. Today, almost every category in the classification of building products has examples of such broadly defined modular components. In fact, it is very difficult at the present time to hold out against the trend. Can the kitchen refrigerator continue to be an isolated, rounded-side-and-top piece of furniture? No longer; it must fit into the architect's concept of an integrated, assembled kitchen area. Can the ceiling-lighting fixture still be individual in size and shape? Not if the manufacturer wants it to be incorporated in one of the acoustic, lighting, air-conditioning assemblies. Can a heating unit allow purely thermal considerations to determine its dimensions? Not if one is after a contract for a school with an integrated under-the-window heating, storage, venting design.

On the following pages are a few examples of assemblies of a very limited number of such "modular components." The reader should multiply them in his imagination many times, and extend the principles illustrated into many other fields of manufacture and design.

May we not lose sight of the fact that the sole benefits from MODULAR ASSEMBLY are better buildings at lower costs. . . . It is questionable in my mind if these benefits will be aided to any great degree just by modular dimensioning unless the products used in buildings are also mass produced, thus enabling the improvement in quality and the reduction in cost through automation. Many . . . assume this will bring similarity in appearance. It behooves the construction industry to solve the problem of either varying the appearance with a combination of identical materials or finding a way to mass produce differently dimensioned products through automation.

WILLIAM GILLETT, Vice-President
Business Planning
Fenestra, Inc.

The continuing development of prefabricated modular components is clearly essential to the future of the building industry. It will not only produce more buildings at lower cost, but will also result in substantially improved standards of building design and performance.

It must be realized, however, that this implies more than mere production of building parts in modular sizes. To be truly successful, each building must also satisfy its own special requirements so that it meets high esthetic standards.

Consequently, modular components must be produced in sufficient variety of sizes, colors, and textures in order to provide architects with maximum latitude in design. Otherwise, Modular Measure could result in a spate of monotonous look-alike structures that could stifle the development in its infancy.

DAVID S. MILLER, Chairman
Merchandising Committee
Producers' Council, Inc.
Vice-President for Marketing
Kawneer Company

Modular dimensioning of building materials, at the factory, so that they will fit together at the building site without further processing is not a new idea but rather the rebirth of a very old idea. For example, the original Temple of King Solomon and other structures built around that time, used MODULAR ASSEMBLY; we are told that the stones were hewn, squared and numbered at the quarries, conveyed by land to Joppa, and thence by sea to Jerusalem, where there was not a sound of any tool of iron—and the stones fitted together at the building with extreme exactness. So we can only conclude that modular co-ordination is a lost art, which should be rediscovered.

B. W. COOK, Vice-President, Sales Manager
Stark Ceramics, Inc.

As we see it, standardized structural steel framing members must be so designed and detailed as to reduce engineering and fabricating costs to a minimum. At the same time, the design should permit flexibility of application so that the architect is free to meet unusual job conditions at a reasonable cost. The open-web steel joist is an outstanding and widely recognized example of this type of standardization. In our own products we have carried the same principle into the design of steel roof trusses for spans up to 130-ft, long-span joists, and complete steel framing systems such as our V-LOK. With this type of standardization the architect is able to pick the required sizes from the catalogued load tables; it works to the advantage of architect, engineer, owner, and manufacturer. We believe the future of lower-cost construction lies in more widespread application of engineered standardization. We have bet our corporate future on it.

ROBERT MACOMBER, President
Macomber, Inc.

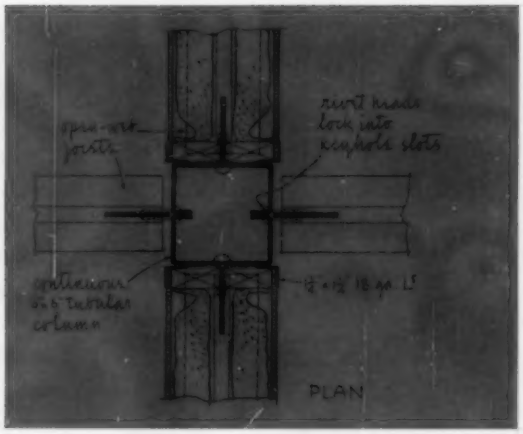
Through standardization the means exist for the manufacturer . . . to produce better quality products in greater quantity more economically. However . . . it is rather useless for the window manufacturer to sit in his office and make modular sketches of window sizes unless he knows that the architect, the contractor, and other manufacturers are also designing buildings and products in accordance with the concepts of MODULAR ASSEMBLY. The AWMA has done and will do everything in its power to support organized programs in this field.

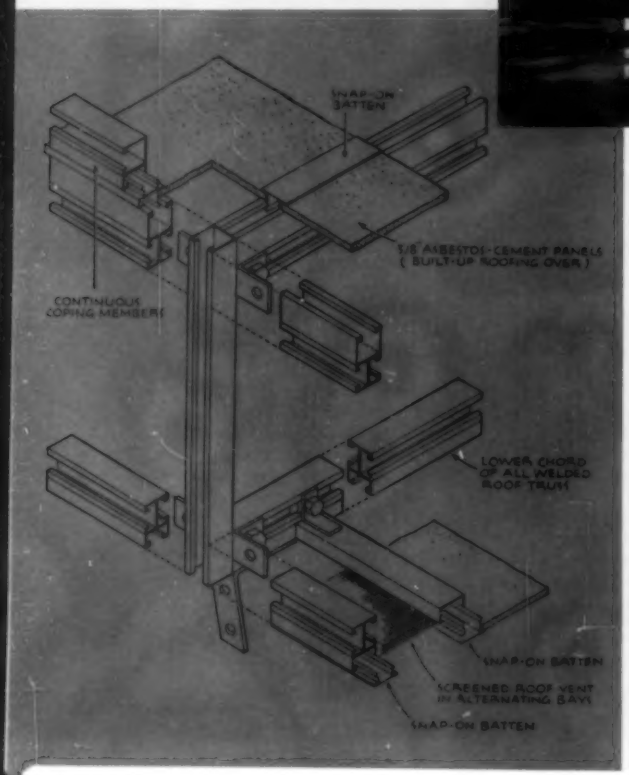
JOHN P. JANSSON, Executive Vice-President
Aluminum Window Manufacturers Association

MODULAR ASSEMBLY is now accepted in theory generally throughout the construction industry. Differences of opinion exist as to the optimum size of the module; manufacturers of asbestos-cement sheets generally accept 4-ft for modular width and cut sheets from 8-ft to 12-ft length. The ever-increasing costs of construction dictate standardization of sizes based on agreed modules to speed field assembly and to reduce waste. Prefabricators have been the first; other builders will follow. There is little inducement to asbestos-cement manufacturers to adopt modular sizes for roof or sidewall shingles; these shingles will become standard modular sizes as soon as they are demanded by architects. It can, therefore, be said that the asbestos-cement industry is firmly committed to the principles of MODULAR ASSEMBLY and will subscribe 100 percent as soon as these principles are generally accepted in the construction industry.

E. A. DENNISON
Asbestos-Cement Products Association
Manager
Building Products Engineering
Johns Manville Sales Corporation

(Continued on page 157)



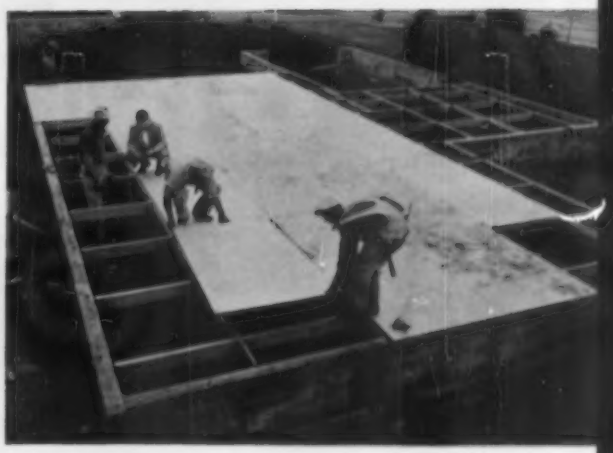

SNAP-ON BATTEN
5/8 ASBESTOS-CEMENT PANELS (BUILT-UP ROOFING OVER)
CONTINUOUS COPING MEMBER
LOWER CHORD OF ALL WELDED ROOF TRUSS
SNAP-ON BATTEN
SCREENED ROOF VENT IN ALTERNATING BAYS
SNAP-ON BATTEN

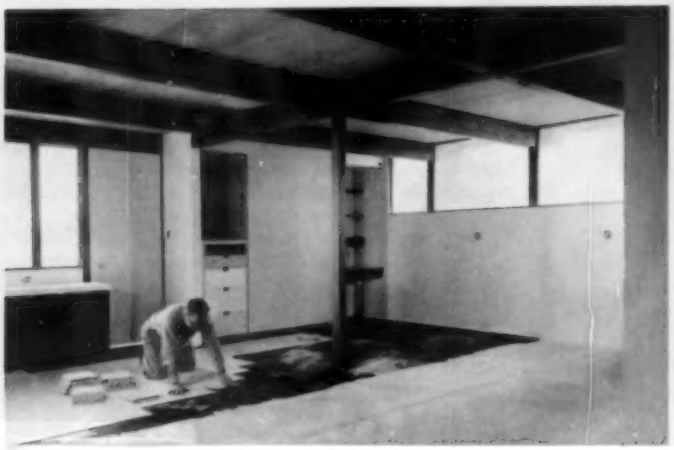
Architect Walter Sanders' modularly designed house (above) *contains Unistrut's structural-framing system composed of standard extruded steel sections (note variety of shapes) that act as chords, struts, snap-on battens, etc. Truss assemblies were erected on 4'-1" module.* Photo: David Reider

For a shopping center designed by Belluschi and Skidmore, Owings & Merrill (left), *economy of construction, maximum flexibility, and pleasant atmosphere were essential to its design. Macomber's modular, prefab framing—composed of an assembly of square structural-steel columns and open-web joists—helped substantially to meet these requirements. Rivets—welded to joist plates—nest into keyhold slots to greatly reduce erection time and lock entire assembly together.* Photo: Dearborn-Masser

floors

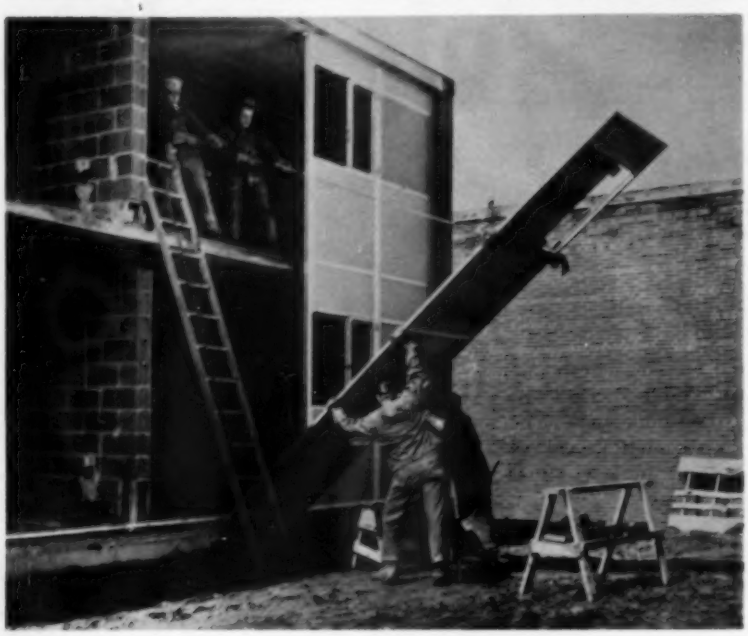
Perhaps the only radical change in wood-floor framing systems during the past 100 years (right and below) *has been developed by the Douglas Fir Plywood Association. Its prefab,* MODULAR ASSEMBLY *consists of 4"x4" posts placed inside footings on four-ft centers one way and eight-ft centers the other. These support 4"x6" girders on four-ft centers with 2"4" blocking under panel edges on same spacing. Seven-ply, 1⅛" panels, with grain running across main girders, are placed so that the edges are supported by the 2"x4"'s. Any kind of finish can be laid directly on the fir plywood.*





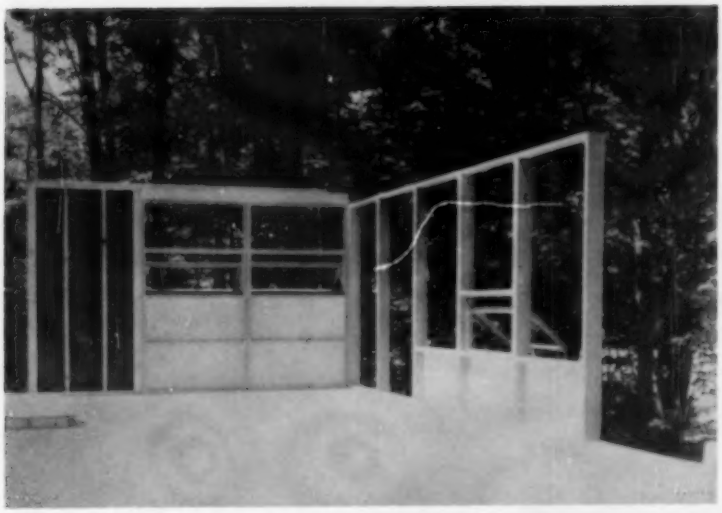
To meet immediate demands for additional dormitory units for married university students, Manson-Carver Associates turned to this system of prefab, two-story curtain-wall assembly made up of grid-type panel curtain-wall components of aluminum and plastic (above and right). *Sash and mullions are aluminum; panels have polyester-resin glass-fiber-cloth faces bonded to asbestos-cement interbands and expanded-polystyrene cores.*

Photos: Haskolite Manufacturing Corp.
Arthur Gorham



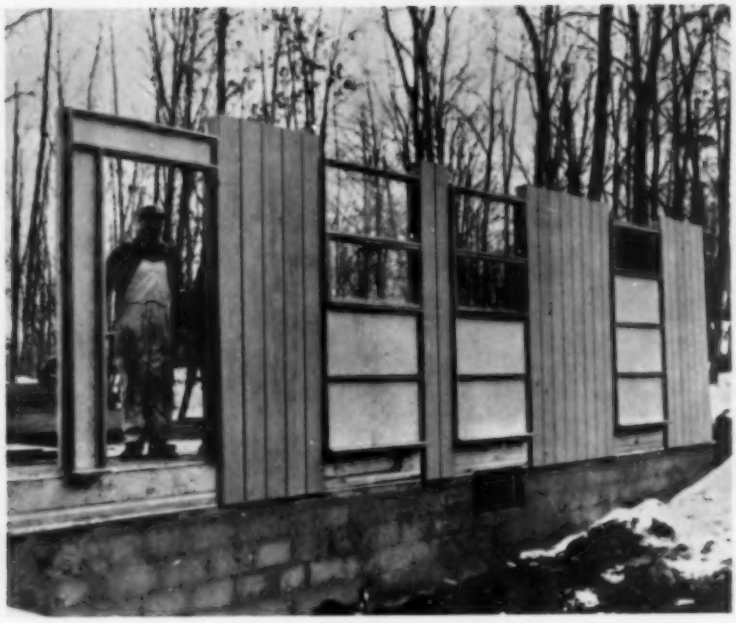
Favorite panel curtain-wall assembly of some architectural designers is the grid-type. For an insurance office building (left and page 141) *Architects Thorshov & Cerny chose a stainless-steel grid, insulating-glass window units, and spandrels of glass (outer face of tempered glass with vitreous color fused on back and thermally efficient back-up pans containing cellular-glass blocks).*

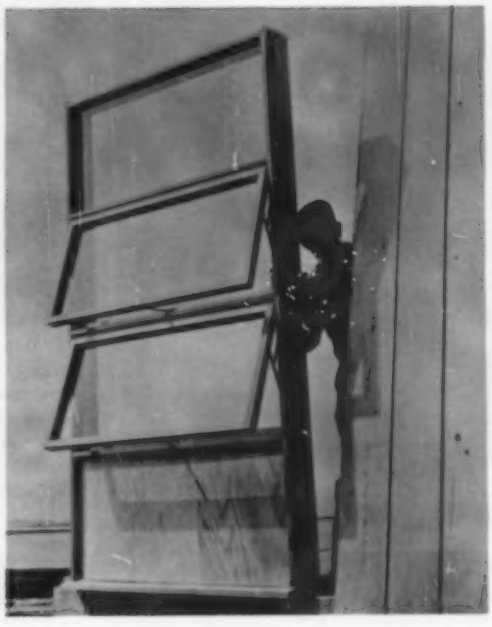
Photo: courtesy of Pittsburgh Corning Corp.



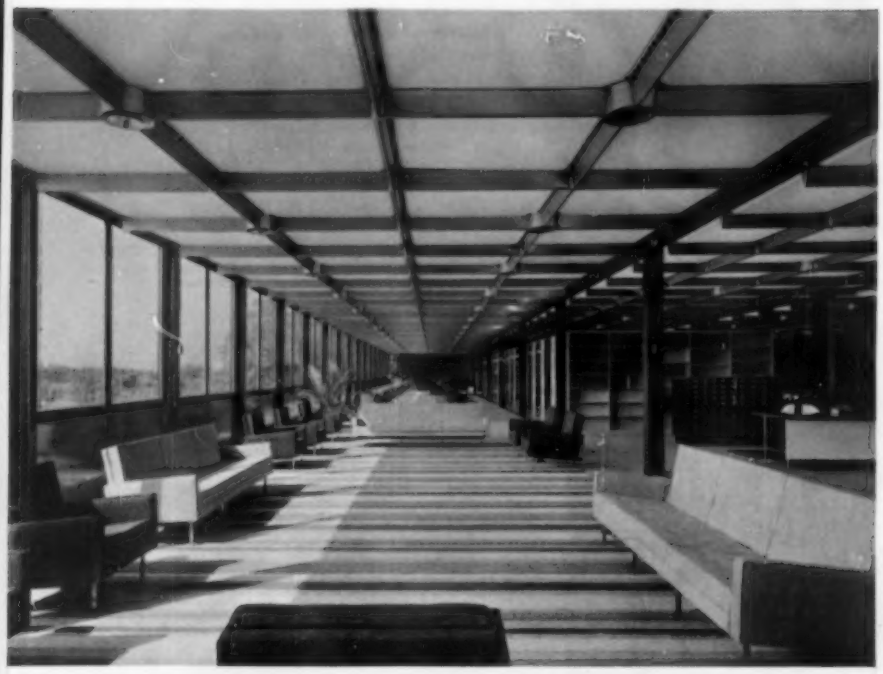
Entire houses can now be assembled from prefab-modular components. In addition to entire walls (either with windows or solid), floor and roof panels, prefab-roof trusses, interior walls and partitions, and smaller nonstructural units are available. The competent designer can arrange these components into first-rate structures.

Photos: courtesy of Fabricators, Inc.





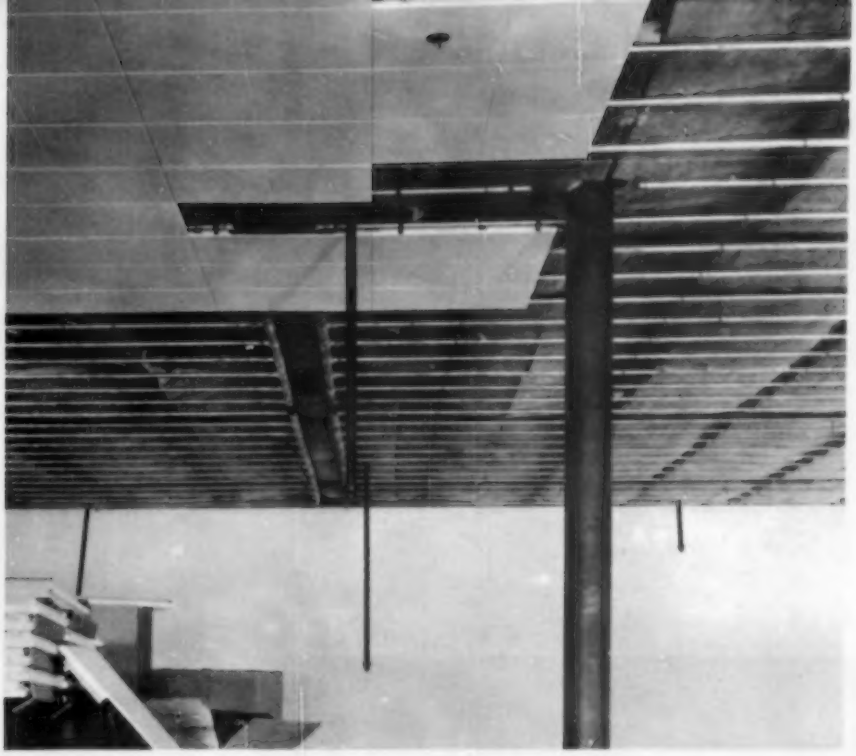
In order to study ceiling and interior partitioning possibilities for the House of Seagram (Mies van der Rohe and Philip Johnson, Architects; Kahn & Jacobs, Associated Architects), Johnson co-ordinated modular Hauserman partitions with Lightolier ceiling components (right). *Attempt was made to combine module of ceiling with the structural module of the building and that of the basic partition unit.* Photo: Marc Neuhof



In its new office building (right) *The Wakefield Company has a ceiling of prefab components integrated with modular partitions below.*

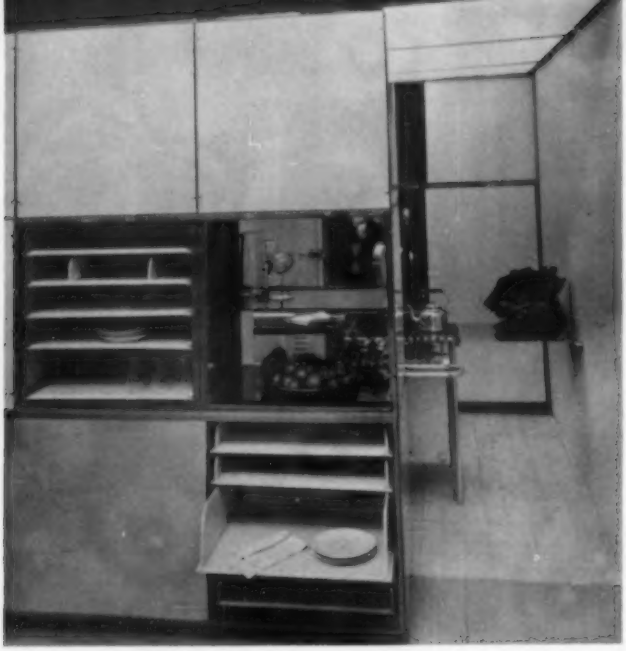
Twelve-in. wide troffers are easily accommodated in modular metal-pan acoustical ceiling (below) *in office space of an insurance building.* Photo: courtesy of Day-Brite Lighting, Inc.

Probably the best instance, to date, of modular co-ordination of exterior-interior wall structure with ceilings and floor planning is found in Saarinen's General Motors Technical Center (Eero Saarinen & Associates, Architects, and Smith, Hinchman & Grylls, Inc., Architects-Engineers). Prefab components in this assembly include luminous ceiling panels, supporting acoustical baffles, air-diffusion units, structural-steel sections, spandrel panels, and window panels.
Photo: courtesy of The Wakefield Company



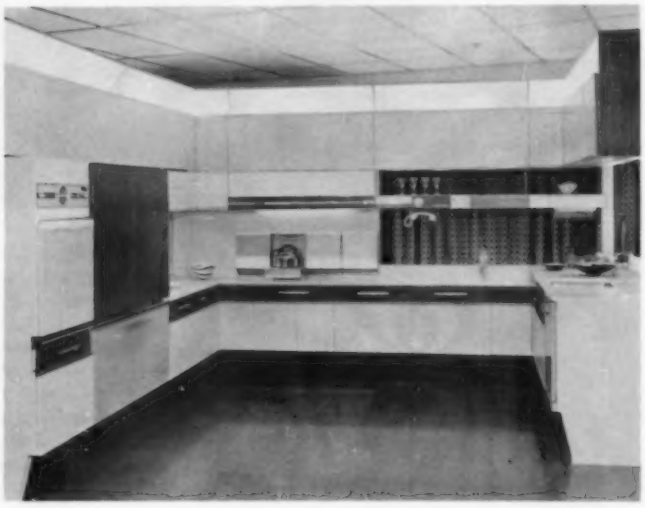
Ceilings—in addition to providing sound control, lighting, and fire protection—can also be the radiating surface to direct (warm) or receive (cool) heat as the season dictates. The method of carrying the heating or cooling medium introduces yet another group of components into the ceiling assembly. Shown (above) *is a radiant ceiling which uses circulating water as the control medium.*
Photo: courtesy of Burgess-Manning Co.

This office-building ceiling (right) *is an assembly of Simplex aluminum panels. Some of the panels are perforated and have insulating material placed above; others will form the bottom channels of air-carrying ducts. All of these components, when assembled, make up a warm-air radiant ceiling.*



Service buffet (above) *is from a model dwelling unit exhibited in the Salon des Artistes Decorateurs, Paris, in 1929; the partitions were made of prefab, standardized cabinets produced by Roneo, a manufacturer of steel office furniture. The cabinets provided storage space for a variety of items—from clothing to kitchen utensils. Designed by Le Corbusier, Pierre Jeanneret, and Charlotte Perriand.* Photo: Jean Collas

Prefab kitchen units for "house of future" (left). *When not in use, Kelvinator pull-down freezer and dryer utilize waste cubic area near ceiling. Unit in foreground houses ultra-sonic dishwasher.*
Photo: courtesy of Monsanto Chemical Co.



Trend in present and future kitchens is concept of "selling kitchens"—not individual appliances. Key to success of such a program is total prefabrication and assembly of individual components at factory. Frigidaire proposes for future a modular kitchen (right) *containing in one grouping an oven, double-door refrigerator, pull-out deep freeze, and storage cabinet, at left of photograph.*

Linen closet and clothes hamper are combined with sliding-door wardrobe (right). *Wardrobe, designed on 4-ft module, can be supplemented by adding increments.*

Photo: courtesy of Fabricators, Inc.

Techbuilt units (left *and* below) *indicate variety of combinations possible by combining basic modular components.* (For other Techbuilt components see page 128.)

Photos: courtesy of *Better Homes & Gardens*

The structural clay products industry was one of the first building-product industries to endorse modular co-ordination and . . . has continuously encouraged the adoption of modular sizes. Many segments of the industry, including all members of the Facing Tile Institute, produce modular sizes only as standard items, and practically all manufacturers will furnish modular brick or structural tile on order. Modular Measure is the only practical method that has been proposed for co-ordinating the dimensions of masonry units of different sizes and the advantage gained through this co-ordination, both in the quality of the masonry and the savings in construction costs, in my opinion, more than justify the adoption of modular sizes.

HARRY C. PLUMMER, Director
Engineering and Technology
Structural Clay Products Institute
Facing Tile Institute

We are convinced that the trend strongly points toward assembling buildings from pre-fabricated parts. To accomplish this building technique most successfully, modular components are necessary. To back up our belief in the future of MODULAR ASSEMBLY we recently developed a modular plastic-and-aluminum "sandwich" panel that is light in weight, translucent, and easy to erect due to its modular sizing. We have turned over a great part of our manufacturing facilities to production of this panel, and believe it will find increasing use in the construction of modular buildings.

JOHN C. STANHOPE, President
Kalwall Corporation

In MODULAR ASSEMBLY we recognize industry's output of mass-produced factory products and equipment, though not necessarily surrendering the freedom of the architect to the iron bonds of the machine nor casting the design into a rigid mold. The architect, by recognizing and understanding both the uses and limitations of today's and tomorrow's mass-produced products and construction methods will, by proper understanding, find a new freedom. Each part of the design can be logically intermeshed with the whole—perhaps with a greater sense of rhythm and unity.

NORMAN HUNTER, Architect
President
Construction Specifications Institute

As a trade association we would greet the advent of modular design with considerable enthusiasm. Because the nature of Porcelain Enamel, and also prefabricated curtain-wall structures do not lend themselves to field modification, it is essential for large-scale development of Porcelain Enameled architectural curtain walls that standardized dies and shop assembly fixtures be used. Without the general acceptance of modular design this is impractical and failure to take advantage of the low-cost and feature-studded attributes of Porcelain Enameled curtain walls would result.

J. W. VICARY, President
Porcelain Enamel Institute, Inc.

(Continued on page 222)

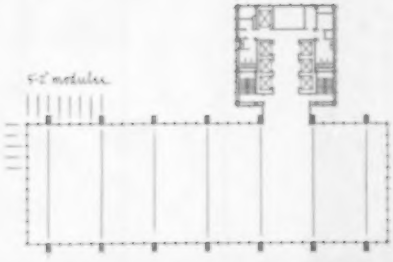
MODULAR ARCHITECTURE

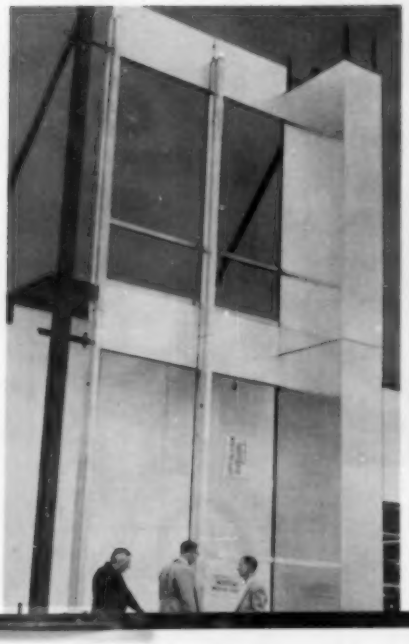
the reality of large-scale site assembly

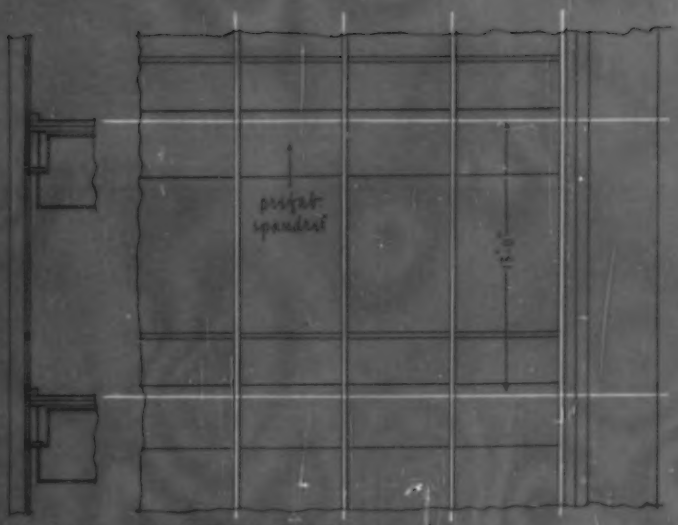
The move toward MODULAR ASSEMBLY of contemporary buildings has been a slow, evolutionary one. As Gropius writes, "we have been amidst a change for at least twenty years." Is the whole concept suddenly about to catch hold, in architecture and engineering, and in manufacture and building—as one aspect of it already has, in the panel curtain wall? And if this is about to happen, in what direction will the design results take us? These points may be argued, as the introductory pages of this issue indicate; but words on either side prove little beyond attitudes or prejudices. To answer the questions, P/A's Editors choose to illustrate two current projects from the offices of Skidmore, Owings & Merrill. Here certainly is great variety and distinction in design; great imagination in the choice and assembly of component parts. This is not 100 percent MODULAR ASSEMBLY, by any means; it is perhaps as close as we have come to it, and it is the design product of a large, commercially successful but design-conscious firm of architects.

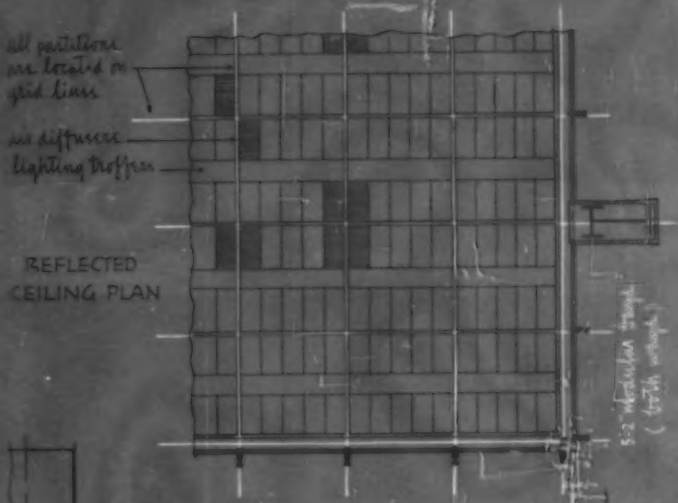
modular planning in three dimensions

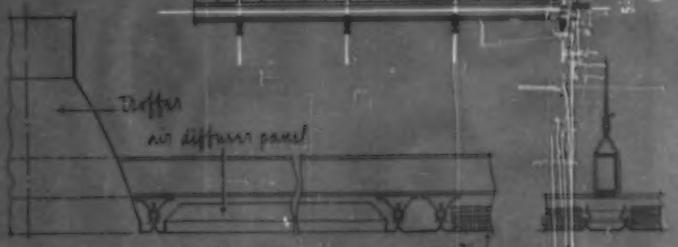
Floor areas of Inland Steel Building, Chicago, are free of columns, service lines, and fixed partitions. "Exterior, interior partitions, lighting, grid system for flexible attachment of partitions, and air conditioning," writes James W. Hammond of the Chicago office of Skidmore, Owings & Merrill, "are all on a 5'-2" module." Spandrel panels, of 16-gage stainless steel, are to be backed with 2-in. concrete fire-proofing. Windows will be fixed and of double-panel glass. Interior steel partitions are designed to be fastened to metal channels in the ceiling grid. This will permit the reuse of panels and their relocation when necessary. Floors are cellular panels of 16-gage galvanized steel which will carry electric and telephone services, as well as hot and cold air to the perimeter of the building. Floor panels will be topped with 2½-in. lightweight concrete. Modular ceiling panels are to be composites of acoustical metal pans, light troffers, and air supply and exhaust diffusers. *Photos: courtesy of Inland Steel Co.*

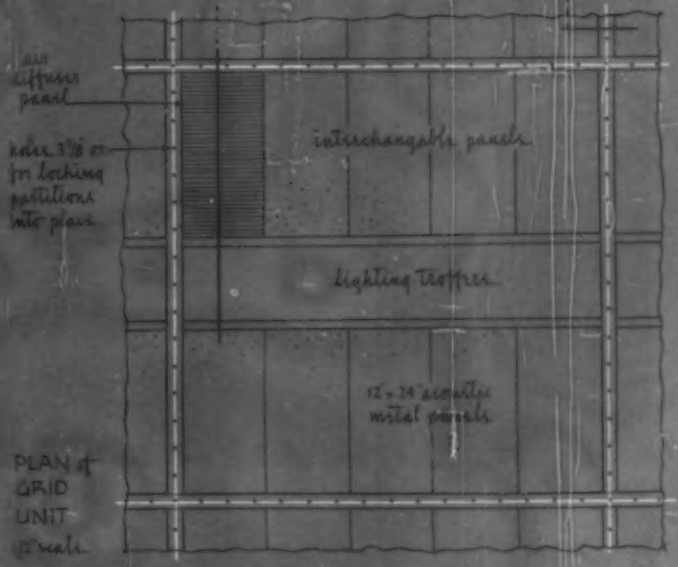

4'-0" modules



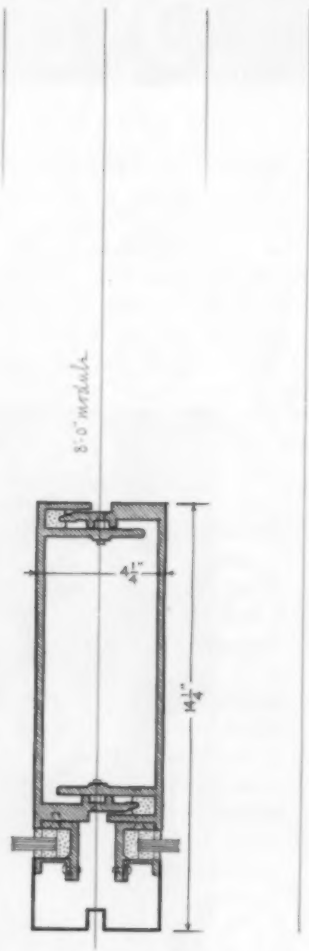

precast spandrel
SECTION
ELEVATION OF BAYS 1/8" scale


all partitions are located on grid lines
air diffusers
lighting troffers
REFLECTED CEILING PLAN


troffer
air diffuser panel
acoustic metal pans
SECTIONS
1/2 scale


air diffuser panel
note 3'8" on long partitions into place
interchangable panels
lighting troffers
12" - 24" acoustic metal panels
PLAN of GRID UNIT
1" scale

interchangeable panels provide flexibility



Built by The Port of New York Authority, the 2300-ft-long International Arrival Building and Airline Wing Buildings at New York International Airport (Idlewild) handle arriving overseas passengers and (in wings) departing passengers on foreign-flag airlines. Functional and physical plans for the buildings were prepared under direction of the Chief of Port Authority's Aviation Planning Division, Thomas M. Sullivan. Skidmore, Owings & Merrill were Architects; J. Walter Severinghaus, Partner-in-Charge; Associate Partner Charles E. Hughes, Project Designer; and Associate Partner Albert Kennerly, Project Manager. Next month, we will present completed buildings in detail; this month, we focus on modular and prefabricated elements of exterior walls.

Two basic modules, 4 ft and 8 ft, were used for an overwhelming majority of the buildings' curtain-wall panels—the larger module applying where the need was for large expanses of glass (on the approach side of the buildings, *across-page*); the smaller module used where there was need for a variety of smaller openings (apron side of the buildings and in service areas, *below*). The module is maintained from center-to-center of the 24-ft o.c. columns.

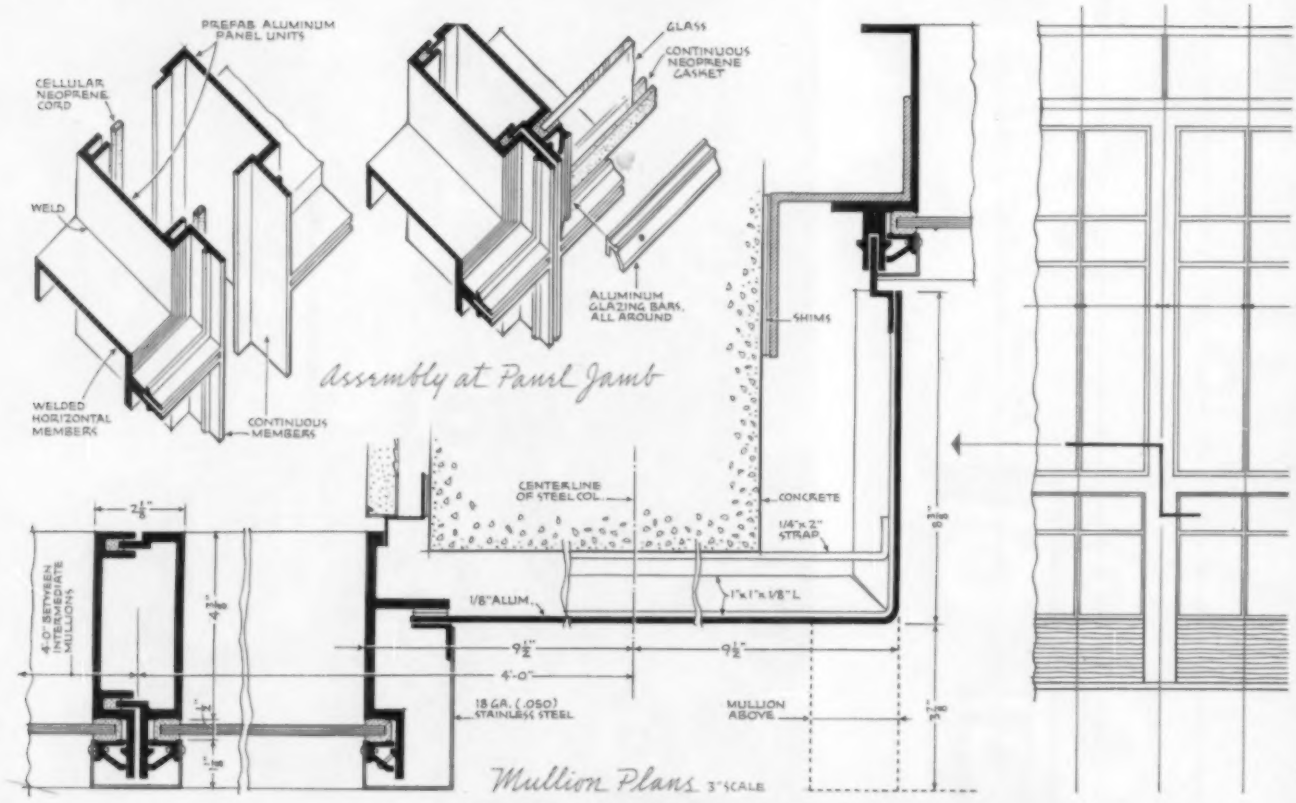
The module of 4 ft was felt to be the most appropriate width to accommodate filler panels ranging from spandrel glass, louvers, and windows, to doors or combined units. Since the panels are interchangeable, the buildings may readily be altered to meet new needs.

The 4-in skin panels—some 2900 of them—were shop-fabricated on production jigs of extruded aluminum, covered on the exterior with stainless-steel cover molds. With welded corners, this resulted in a strong, accurate frame with a weathertight rabbet to receive the neoprene-gasketed glass (JUNE 1957, P/A NEWS SURVEY), louver, or operable sash fillers. The individual aluminum frames are interlocked with two neoprene cords between each pair of frames. The interlock on the module line was designed as a labyrinth to allow for watertight expansion and contraction of the individual frames; vertical expansion of the individual frames is handled with slotted holes in the clip angles.

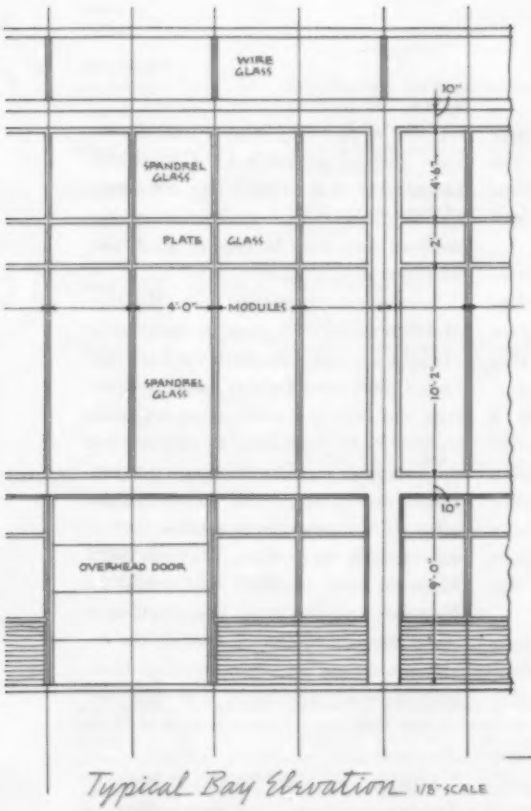
Design of the frames for the large glass areas where the 8-ft module is used is similar to that of the 4-ft frames, but the size was too large for complete shop fabrication, and they were bolted into frames at the site and then erected. Since the vertical mullions in these areas (*see section*) in some instances span up to 32 ft and take a wind load of 80 m.p.h., they were designed as slender tubular beams with the interlock on the module line. Adoption of the module greatly simplified the working drawings, since practically all joints are on the module. There were almost no exterior wall dimensions needed on the plans, and elevation sheets became completely diagrammatic, with each type of panel coded with a letter and shown at large scale on detail sheets. SELECTED DETAIL (*overpage*) documents the curtain wall and assembly of typical mullions.

wall section

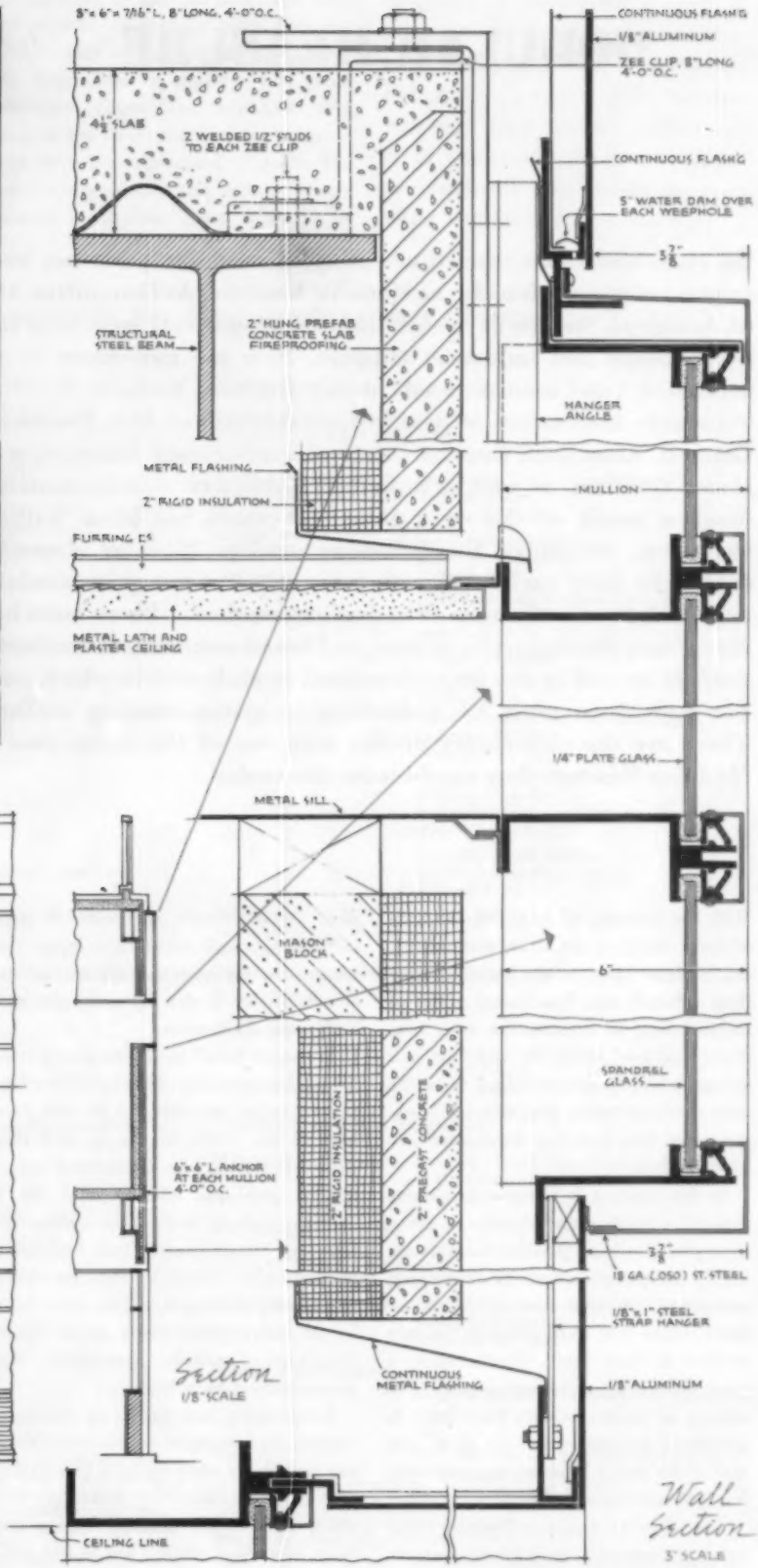
GOTTSCHO - SCHLEISNER



INTERNATIONAL AIRLINE WING BUILDINGS, New York International Airport



Typical Bay Elevation 1/8"SCALE



Section 1/8"SCALE

Wall Section 3" SCALE

Skidmore, Owings & Merrill, Architects

William Demarest

MODULAR MEASURE

the working tool for modular assembly

No conscious move toward assembly of modular parts has been so persistent or so fruitful as Modular Measure. As Committee A62 of American Standards Association, its proponents have long had professional and industrial support. Now the movement is coordinated (and incorporated) under the new Modular Building Standards Association, with active sponsorship of AIA, Producers Council, Associated General Contractors, National Association of Home Builders, as well as individual members. Administratively heading much of the work in recent years has been William Demarest, author of the following article. *Modular Assembly* cannot be fully successful with a vaguely but not-quite modular approach to manufacture or to drafting methods. There must be a discipline; there must be an accepted lowest-common-denominator module as well as the large structural module within which parts fit; and there must be a drafting-designing-detailing method. These are the elementary needs: with use of the techniques of Modular Measure they can become the tool.

Former Modular Co-ordinator of The American Institute of Architects, Washington, D. C.; Demarest has recently become the plastics-in-building consultant for Manufacturing Chemists' Association, Inc., also of Washington.

Achad

With the blessing of AIA and the help of many building materials manufacturers, Modular Measure was launched more than a decade ago. Traditional modes of dimensioning in construction were irrational and haphazard. By now, the new system is widely acknowledged to be the only practical means available for bringing order into building dimensions and product sizes.

In this light, it is puzzling to observe that (1) a heavy preponderance of architects who have used Modular Measure are highly enthusiastic about its advantages, and yet (2) the total number of architectural offices that have adopted the new method is very small. Furthermore, a great many students emerging today from schools of architecture to start work in architects' drafting rooms, are quite ignorant of the way a Modular working-drawing is dimensioned and why.

The following report on Modular Measure is an attempt to gage the present performance of this method of dimensioning, from the architect's viewpoint. It may incidentally shed some light upon the reasons for the hesitancy about the new system, shown to date by architects and architectural educators.

The word "new" can be used only relatively when speaking of Modular Measure. Proposals for something of the sort date back to the 1920's. It was in 1936 that Albert F. Bemis, a public-spirited industrialist, published his proposal for a "cubical modular method" as a means of reducing housing costs. This laid down the principles of Modular Measure which, after being developed a little more fully by an industrywide study group under American Standards Association, was promulgated late in 1945.

Establishing four inches as the basic module for construction, Modular Measure provides a simple means of correlating the dimensions of buildings with stock sizes of the materials going into them. Buildings are laid out in 4-in. multiples and material units are sized to fit together in repeating joint-to-joint dimensions likewise divisible by 4 in. These two aspects of the single idea are essential to the practical application of the method; they must be kept in mind, too, whenever discussing it.

Subsequent promotion of Modular Measure under AIA auspices necessarily placed most emphasis upon the building-layout side: the Modular working-drawings and details. Modular-size materials were already beginning to appear, but the necessary modular drawings were not. Either aspect, of course, influences the other. It is reasonable to surmise that, if substantially all working drawings were Modular, most material sizes would be Modular—and vice versa. This situation is often assumed to explain entirely the reluctance of the profession to adopt Modular Measure—architects, it is said, are merely awaiting a wide selection of Modular materials.

Strictly speaking, Modular working drawings are only these that indicate a

certain aid to dimensioning: the three dimensional Modular reference grid, the spacings of which are, of course, always 4 in. This grid is the link between the sizes of the parts and the layout of the whole. Nonetheless, upon noting how very few architectural offices report themselves to be using Modular Measure, one wonders whether there may not be a great many architects who unknowingly almost do employ this principle. Inefficiently perhaps, and without the grid (and without a name to describe what they are doing), they are adjusting building-layout dimensions to accommodate stock unit sizes. These days, indeed, a great many of the most-used sizes are modular, even when not advertised as such. The list of components which follows is necessarily incomplete, since it would be too tedious to name all product types, some units of which might be made to go together in increments that are 4-in. multiples—if the detailer is sufficiently adept at making them work out that way. With more truly Modular building materials coming into the market all the time, architects may already be more nearly Modular than they think!

available components for Modular-Measure dimensions*

Masonry

Brick	Structural Clay Products Institute 1520 18th Street, N. W. Washington, D. C.
Concrete Block	National Concrete Masonry Association 38 South Dearborn Street Chicago, Ill.
Tile	Structural Clay Products Institute 1520 18th Street, N. W. Washington, D. C.
Natural Stone	Indiana Limestone Institute P. O. Box 471 Bedford, Ind.
	The Marble Institute of America 32 South Fifth Avenue Mount Vernon, N. Y.
	Building Stone Institute 2115 Martindale Avenue Indianapolis, Ind.

Glass Block

Vents

Screens

Windows

Aluminum	Aluminum Window Manufacturers Association 45 North Station Plaza Great Neck, N. Y.
Steel	Metal Window Institute Cheltenham, Pa.
Wood	National Woodwork Manufacturers Association, Inc. 332 South Michigan Avenue Chicago 4, Ill.

Doors

Steel	Steel Door Institute 2130 Keith Building Cleveland 15, Ohio
Wood	National Woodwork Manufacturers Association, Inc. 332 South Michigan Avenue Chicago 4, Ill.

Ceiling Components

Acoustical Tile	Acoustical Materials Association 335 East 45th Street New York, N. Y.

Troffers

Diffusers

Package Assemblies

Curtain-Wall Panels

Metal Partitions

Wood-Frame Construction (Based on 16" o.c. stud spacing)

Wallboard, plywood, siding, roofing, etc. including interior and exterior finishes in 16", 32", 24", and 48" widths	Douglas Fir Plywood Association 1119 A. Street Tacoma 2, Wash.
	Hardboard Association 205 West Wacker Drive Chicago 6, Ill.
	Asbestos-Cement Products Association 509 Madison Avenue New York 22, N. Y.
	Gypsum Association 20 North Wacker Drive Chicago 6, Ill.
Metal lath	Metal Lath Manufacturers Association Engineers Building Cleveland 14, Ohio
Insulation	National Mineral Wool Association 2906 Americas Building Rockefeller Center New York 20, N. Y.
	Insulation Board Institute 111 West Washington Street Chicago 2, Ill.

Combined furnace, hot-water heater, central air-conditioning

Warm-air heating ducts

Prefab, folding, attic stairs

Flue Lining

Clay	Clay Flue Lining Institute 161 Ash Street Akron, Ohio

Fire-Extinguisher Cabinets

Plumbing Fixtures	Plumbing Fixture Manufacturers Association 1145 Nineteenth Street, N. W. Washington 6, D. C.

Drinking Fountains

Shower Stalls, stamped

Kitchen Cabinets	Steel Kitchen Cabinet Manufacturers Association Engineers Building Cleveland 14, Ohio

Major Appliances

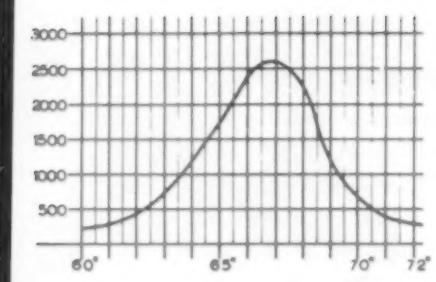
Electric	National Electrical Manufacturers Association 155 East 44th Street New York, N. Y.
Gas	Gas Appliance Manufacturers Association 60 East 42nd Street New York 17, N. Y.

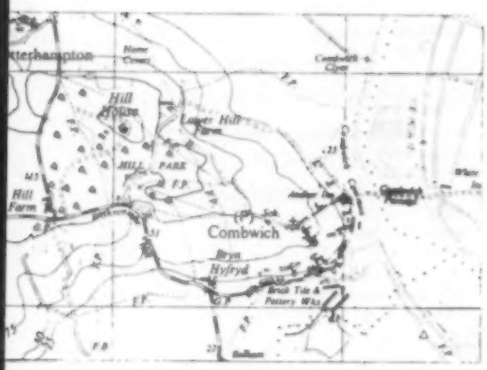
Air-Conditioning and Refrigeration Equipment

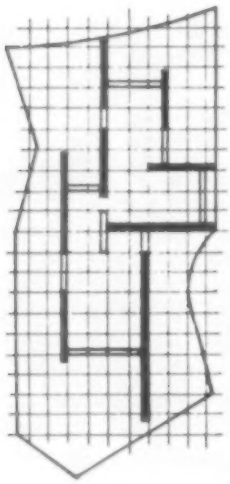
Air-Conditioning and Refrigeration Institute
1346 Connecticut Avenue, N. W.
Washington 6, D. C.

*No complete list of available components for Modular-Measure dimensioning exists and similarly, no complete tabulation of manufacturers of these components has been compiled. Presented above are many component-types that are known to be produced on the 4-in.-module principle. Where they exist, associations and institutions—which have indicated a willingness to furnish architects and engineers with names of their members offering products for Modular dimensioning—are named. A tabulation of individual manufacturers of Modular-Measure components was not attempted, since it would inevitably be incomplete and might give a disproportionate picture.

Modular Measure: reasons for co-ordinated dimensioning







In the communication of information, we are accustomed to and readily understand the reference grid: used as a graph (top), *on a map* (center), *or in building* (bottom).

Our building industry is often likened to that of agriculture—the only basic U. S. industry larger than building, according to most people's figures. By their very natures, the two have much in common. Each is vast in size, supplying a fundamental need of the population. Although giant corporations are operating profitably in each field, both include a vast number of small entrepreneurs, to be found in most localities across the land.

As in agriculture, tradition and conservatism have loomed large in the building industry. In the former, during recent years, the consumer has benefited increasingly from the analysis and reorganization of the processes of farming, food storage, and transportation — processing and marketing in the light of current technology. Such progress has been slower to appear in construction; however, since World War II, improved techniques have been accepted more readily than in the past. Now, a more or less concerted effort is being made to analyze the building process in its entirety, with the thought that it should be organized to make the most of present and impending technological advances.

A basic trend, common to other important American industries, is now beginning to appear in building construction. "Industrialization" is perhaps the most apt of several terms used to describe it. Its philosophy was recently summed up by a building researcher this way: "Industrialization requires that the product be made and stocked without knowledge of just who will buy it and just where it will be used." The "industrialization" of building tends to encompass a growing range of materials; it is aided and abetted by a strong trend in present-day design—"component" assembly *(page 148)*.

standardization

Any "ideal" of an all-bolted, all-gasketed assembly serves only to represent the theory of the component method. Few, if any, of its advocates hope to see it practiced to such an extent in the immediate future. At the same time, it is a fact that the building process is undergoing industrialization and that the unpopularity of the component approach to design is a major factor favoring this development. It can be noted that completed buildings which have carried the concept furthest are very often costly "showpiece" designs, employing specially fabricated components. The missing element in such cases —and the link needed for industrialization of the whole procedure—is mostly dimensional standardization.

The considerations here are quite obvious, since they have to do only with the fitting together of building components. The basic point (and perhaps the one most difficult of solution) is that each type of joint detail must be pretty much standardized as to size and shape. There is considerable latitude in the stringency of this requirement, but it seems to have become progressively more precise and limited with the advance from masonry (mortar joints) to inflexible metal-to-metal points of some complexity. This trend need not persist as a necessary concomitant of industrialization; the advent of all-glued structures, for instance, might reverse it and permit somewhat greater latitude in joint standardization. There are countless possible variations in the ways a component must fit other component parts of the building (including duplicates of itself). Fitting together thus, without need for "specials," demands both that the joints themselves be standardized and that the over-all, joint-to-joint dimensions of components likewise be brought under control. This is merely a matter of size and fit; beyond this limited scope, it has no design significance. What happens between joints (edges, surfaces, and ends) of a component may be far more important; yet, from the viewpoint of routine assembly, is not significant.

assembly on a grid-pattern

The typical rectangularity of most buildings suggests the basis upon which the layout of components may be co-ordinated. A flat-roofed, boxlike building made entirely of component panels, for instance, could readily be laid out by following a rectalinear grid, in three dimensions, spaced according to the "repeat"—or module—by which the panel unit is assembled with its identical neighbors. This panel module would not necessarily equal the outside dimension of a unit; it would be governed by the assembled panel *and* joint. Just like the length of a wave-cycle, the module would be the dimension from a certain point (say, mid-joint) to the next identical point, repeated (mid-joint again). An interesting report on the actual development of such grid systems for the Hertfordshire (England) prefab school-building program was recently published.[1]

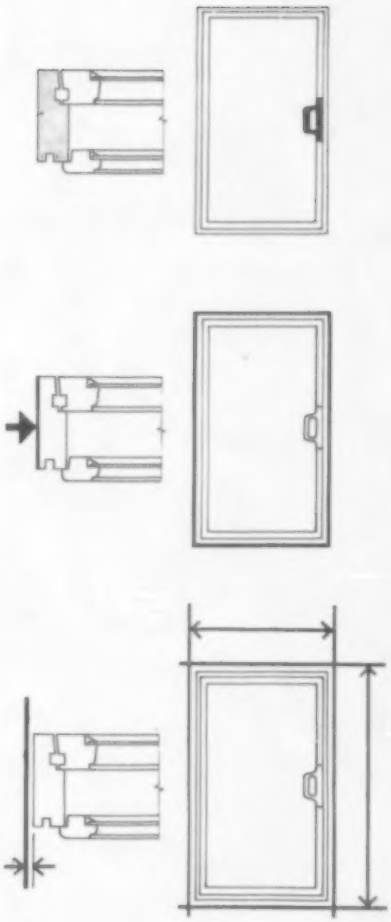
A modular grid of this sort provides a simple and practical method for co-ordinating the layout of a building with the size of the component. It is very commonly used by architects these days, but generally running in one dimension only. The best example of this is the horizontal dimensioning of ribbon windows that run across at least one entire façade, thus permitting no "take-up" at either end. The designer must employ a module, the dimension of which probably does not equal the width of the individual window unit. Further, for steel-framed office buildings, the architect correlates the different horizontal modules of fenestration, of office width, and of structural bays.

This is sufficient for isolated dimensional co-ordination, where the sizes of components can be adjusted to suit the module selected. Such freedom is likely to be achieved, however, only by specially ordering the desired sizes. Whether it now costs more than using stock sizes (for larger structures), the "special order" obviously conflicts head-on with the smooth quantity-production and distribution of standard items. It blocks reductions offered by industrialization.

Therefore, the assembly-grid principle has been carried one step further. A universal Modular grid has been established for the U. S. building industry, in an attempt to provide a common basis for correlating stock sizes of all building materials and equipment. This grid employs a 4-in. module in each of its three dimensions. It is expected that this relatively small module will function as a "least-common denominator" for substantially all stock units of whatever magnitude. Their nominal (or "grid," or "modular") sizes need only be some multiple of the basic 4 in. in order for them to fit readily into the assembly grid. Into the building, that is, without need for further fabrication or on-site alteration.

This dimensional system, of course, is Modular Measure. Its Modular grid has further usefulness to the draftsman and contractor in terms of simplified and more orderly dimensioning. Trouble making fractional dimensions can be kept to a minimum under Modular Measure. Furthermore, those remaining are pulled out of controlling dimension-strings and isolated, since the only cumulative units of measurement are the 4-in. modules.

For these and related reasons, the system is already being used to advantage by a number of architects without awaiting the availability of a wide array of stock building components in modular sizes. The real significance of Modular Measure, however, lies in the fact that dimensional co-ordination in the building is an absolute necessity, if the trend to industrialization is to prevail. Just as industrialization appears to offer the only avenue to reduced building costs, so does Modular Measure offer the only practical approach to co-ordinated sizes and dimensions.



A modular component (top) *has two attributes: its profile is designed to be co-ordinated with other modular components* (center); *its dimensions are derived from its modular dimensions* (bottom).

Sketches from Modular Co-ordination in Building, *Project 174, European Productivity Agency of the Organization for European Economic Co-operation, August 1956.*

[1] "*Flexibility Through Standardization.*" JULY 1957 P/A.

Modular Measure: dimensioning drawings

Modular Measure facilitates orderly systematic dimensioning of working drawings by introducing an "egg-crate" of reference planes throughout the entire space that the building will occupy. The egg-crate consists of series of parallel planes, each using a *4-in.* spacing, since that is the basic module. On paper, these appear as lines making a grid of 4-in. squares—the gridlines.

Preliminary sketches are affected by Modular Measure in only one way. If design modules are used in laying out the building, they should be multiples of 4″—such as 16″, 40″, 7′-8″, etc. Any 4″ multiple whatsoever will do, the idea being simply to make it easier for the draftsman, later on, to convert preliminaries into scale-drawings dimensioned in multiples of the basic 4-in. module.

Draftsmen must form the habit of beginning details with the gridlines and must set them down first in starting a detail-drawing of any kind. This has to be an inviolate rule for any drafting team that intends to produce Modular drawings. There are no exceptions: even hasty freehand sketches of only part of a detail, jotted down during discussion or study of a problem, must all start with an indication of the 4-in. Modular grid. (An underlay showing the grid will not do, although it can be useful as a guide for drawing in the gridlines.) If a detail is going to be worked up on the final sheet, it is helpful for the draftsman to rule the gridlines in ink or on the back of the tracing paper. Thus, they cannot be erased as changes are made; it is essential that they appear on the blueprints. When dimensioning a Modular detail, the draftsman locates the surfaces of parts, centerlines, etc., by dimensions to the gridlines shown, not to points elsewhere in the building. (Because of the 4-in. grid, a Modular detail should require fewer small, fractional dimensions than a detail drawn the old way.)

Most "modular" drafting rooms set a dividing line at the scale of ¾″ = 1′-0″. Smaller scales are considered too fine to actually show the 4-in. grid; *all* drawings at larger scales must show it. Small-scale layout drawings – plans, sections, and elevations—give nominal, or "grid," dimensions wherever feasible. The draftsman must understand that the grid is still there, even though it cannot be indicated when the building is drawn at such scales. Insofar as possible, these drawings show nominal surfaces: nominal walls and partitions, nominal finished-floor, etc. This will mean that, for the most part, lines indicating such surfaces will coincide with (invisible) grid lines. Thus, the distance between the arrow at one end of a dimension-line and the arrow at the other end will be some multiple of 4 in. This rule should not be interpreted to mean that such things as nominal 6-in. stud-partitions and nominal 10-in. cavity-walls must be increased arbitrarily to 8 in. and 12 in. The nominal dimensions should be used as originally intended. And, although nominal finished-floors must be located on gridlines, floor *thicknesses* need not be 4-in. multiples. Modular Measure introduces no requirements as to ceiling heights. On small-scale plans for houses of conventional wood-frame construction, a single arrow is commonly used to indicate the actual face of a line of wall-studs or partition-studs, coinciding with a gridline.

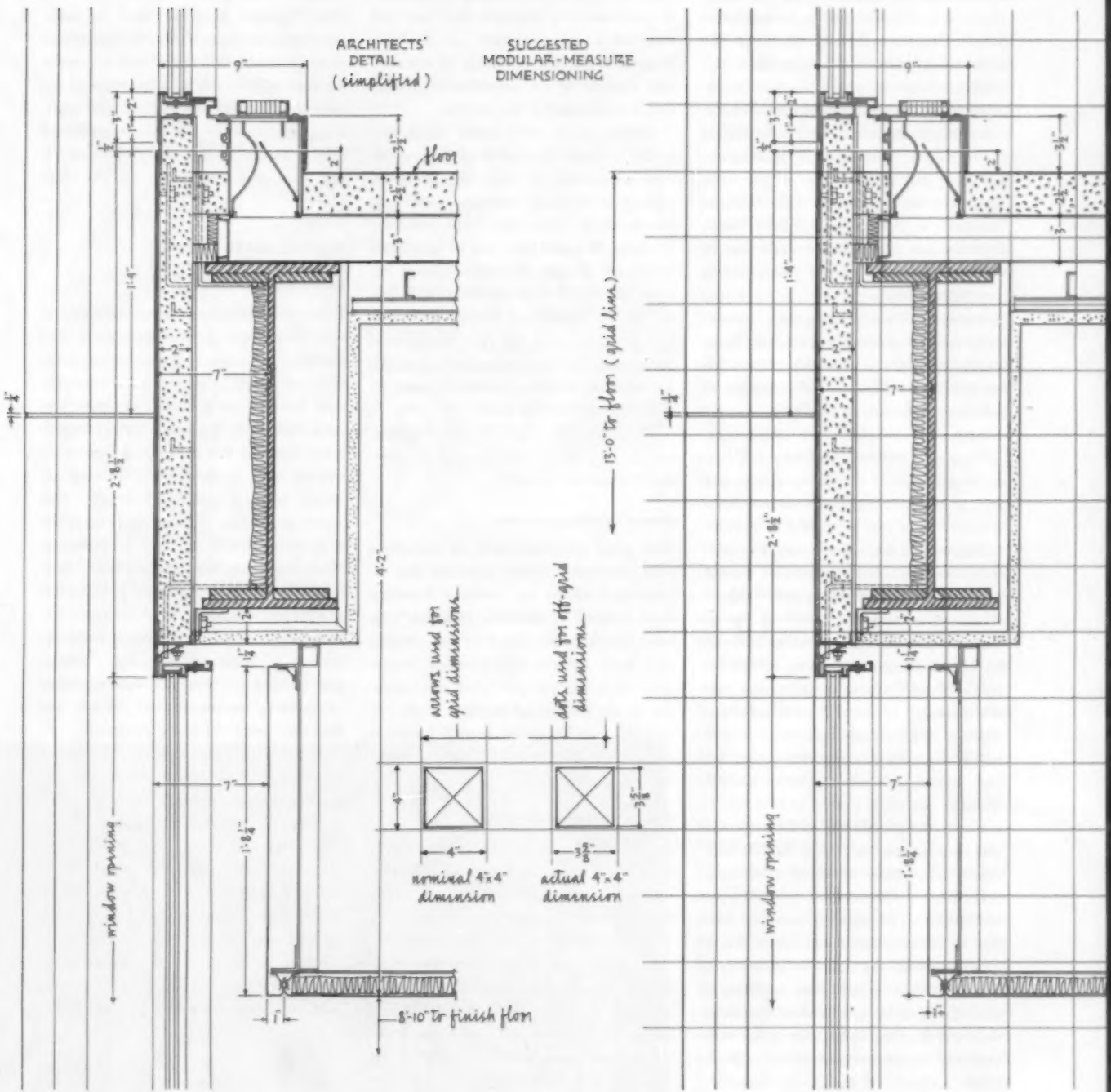
Dots and arrows at the ends of dimension-lines have a specific significance on modular drawings. This arises from the fact that the 4-in. Modular grid cannot be indicated on small-scale plans, sections, and elevations. In referring back and forth between these layout drawings and (larger-scale) detail drawings, it is necessary to know exactly where any particular detail fits into the building as a whole. The Modular grid makes this clearly apparent, even when the same detail occurs at several different locations. This is possible simply because the grids on the various detail-drawings actually represent small portions of the three-dimensional, over-all building grid. Almost all the lines to which dimensions are taken on the small-scale layout drawings will coincide with lines of the building grid. In other words, they will be gridlines; it is therefore important that they be identified as such. Hence, the rule that, on all Modular drawings, a dimension taken to a gridline is indicated by an *arrow*; but where a dimension-line terminates off the grid, a *dot* must be used instead (*illustrated acrosspage*).

For example, when the nominal jamb of a window is located on a small-scale plan by a dimension-arrow, it is evident that this dimension is to a gridline. On the window detail, that gridline is seen as part of the regular 4-in. Modular grid which always appears on large-scale drawings. Recognizing the same gridline apearing on both the plan and the detail, the construction man readily understands just where the designer intended that jamb to be located. Whether at large scale or small, whether the grid is drawn in or not, the draftsman uses an arrow when dimensioning to a gridline; when dimensioning to a point off the grid, he uses a dot.

Vertical dimensions are co-ordinated in modular drafting by setting nominal finished-floors coincident with horizontal gridlines. Actual finished floors are generally located ⅛″ below a gridline, with one exception. In wood-frame construction, the top of the sub-floor (or of slab-on-ground) coincides with a gridline.

Many architects report, after they have started to dimension working drawings and details by Modular Measure, that this system encourages two things: drafting short-cuts, helping produce drawings, and clarity of presentation – which not only is helpful to those in the drafting room but also assists the contractor and his men to get the job built in strict accordance with the architect's intentions. A significant comment is often heard: "*The gridlines make everything fit.*" In essence, once the draftsman has formed the habit of thinking primarily in terms of the aforementioned "3-D" egg-crate, instead of "1-D" dimension-lines, he has mastered the principle of Modular Measure. He is then well on the road toward more orderly, more accurate drafting.

Details of typical spandrel in Inland Steel Building, Chicago. Architects: Skidmore, Owings & Merrill. Detail (left) *shows standard method of dimensioning as indicated on the architects' drawings. Detail* (right), *however, suggests how drawings might have been executed—if Modular-Measure dimensioning had been chosen. (Dimensions developed by author.) Additional discussion and photos of the Inland Steel Building are presented* (page 158).



Modular Measure: present performance

Modular Measure has been touted widely in the architectural world. AIA has co-operated in staging seminars, publishing booklets, etc.—all intended to interest the architect in the new mode of dimensioning and to explain how it accomplishes benefits for him and his client. Many AIA members have heard Modular Measure's claims of performance forcefully expounded by one of its most notable practitioners—C. E. Silling of C. E. Silling & Associates, Charleston, West Virginia, a Fellow and past Director of the Institute. He has preached the Modular "gospel" at countless architects' meetings and has intrigued his audiences by reports of large "profits" open to the practitioner through the efficiency and economy of Modular Measure. Drawing upon the experience of his own small, but highly productive, office, Cy Silling has made Modular Measure sound mighty attractive—spectacularly helpful to most phases of an architectural practice.

Skeptics have wondered why it should seem that most of the enthusiasm in support of Modular Measure's claims should emanate from just a handful of people—Silling and a few others who, like him, became excited about the method through use of it. Actual practitioners of Modular Measure were rare, not long ago; it was thought, however, that this should no longer be true, following the profession's decade-long exposure to the idea. Accordingly, 131 architectural offices of diverse geographical location were written, and invited to comment—if they had had actual experience with Modular Measure—up eight claims (stated below) made by the proponents of the system. It was emphasized that "Modular Measure" meant preparation of working drawings according to the drafting practices prescribed by AIA—using 4 in. as the basic unit in dimensioning; indicating this on detail-drawings by actually showing the 4-in. grid in which the building is placed; using an arrow when dimensioning to a gridline, otherwise a dot to locate any surface not coincident with the grid.

Twenty-six firms responded that they had followed Modular Measure, thus defined; each commented on at least a few of the claims in question and how they had been borne out in actual practice. Some claims, such as the reduction of draftsmen's errors, were widely endorsed; others were sharply challenged. A small minority reported that they had undertaken the adoption of Modular Measure; yet, for a variety of reasons, had thought it an unprofitable change and had abandoned the attempt.

Certain points were made, again and again, by those who had used the system: The co-operation of one's structural engineers is critically important; modular exterior-door sizes are badly needed; Modular Measure must not be permitted to dictate design decisions. It also became clear that the schools have failed, so far, to familiarize future draftsmen and architects with the new dimensional procedure. The continuing lack of modular sizes of building materials was, of course, frequently decried.

These are the eight Modular claims, one by one, along with some of the comments received on each:

fewer drafting errors

The great preponderance of architects who commented stated definitely that dimensional errors on working drawings were reduced by Modular Measure. This was generally attributed to the simpler and more obvious indication of dimensions than was possible when dimensioning in the traditional manner. Some felt that this one immediate benefit furnishes ample justification for taking up Modular dimensioning.

fosters clearer detailing

Insofar as it can be compressed into a few words, the argument of Modular enthusiasts that the method can clarify detail-drawings arises from its use of a three-dimensional system of co-ordinates. This appears on large-scale drawings as a grid, forming 4-in. squares. The draftsman, it is said, is forced to "think through" a detail with care, since he must locate key points properly within the omnipresent Modular grid by reference dimensions to grid lines.

By and large, actual experience would appear to substantiate this claim. Detailing is an important aspect of design and is at the very heart of the drafting operation; different architects will view it in different lights. The comments received varied accordingly, but almost all who liked Modular Measure liked its influence upon large-scale details. Exceptions were those who said they found the modular grid inapplicable to some types of details. Another interesting, and also negative, fact emerged: No one complained of the bother of indicating the grid on his large-scale drawings, in the first place.

drafting costs reduced by faster production of working drawings

Efficient drafting-room production can result only from good organization and training; improved dimensioning practices can never be more than a contributory factor. This probably explains why some firms with Modular-Measure experience consider the method ineffective in cutting costs, in the face of the majority which feels that it undoubtedly does speed production and thereby reduces the expense of producing a set of drawings. Most comments were unqualified: "Definitely lower drafting costs"; "speedier production and lower costs always"; etc. Some did not have cost records complete enough to substantiate savings; others, new to Modular Measure, were confident of realizing economies, but did not feel that they were yet being achieved.

Any change in a going operation must be thought of as an investment, since a dip in efficiency is inevitable. Until architectural schools make a practice of familiarizing all students with Modular Measure,[2] the conversion of each office will call for a period of training (which is most practical to spread out, crew by crew). Losses caused by such inefficiency represent an investment that the architect hopes to recoup as his drafting force begins to work more smoothly and rapidly

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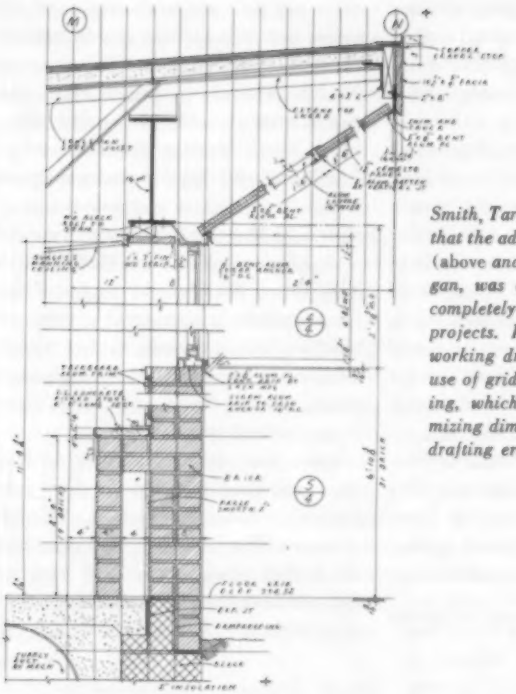
[2] *A significant comment was received from one large architectural and engineering firm which has been using Modular Measure for some years: "We know that some draftsmen have come to work for us just because they want to learn Modular Measure. Our Chief Draftsman reports they lose no time learning the system and, with very little instruction, they are practically educated within a week or two."*



Smith, Tarapata, MacMahon, Inc., report that the addition to the Pembroke School (above *and* below), *Birmingham, Michigan, was one of their most successful completely integrated Modular-Measure projects. Regarding the production of working drawings, they found "that the use of gridlines required less dimensioning, which naturally resulted in minimizing dimensional error as well as line-drafting error."* Lens-Art Photos

by Modular Measure. This was not emphasized in the comments received, but other sources have confirmed that apprehensions as to the actual efficacy of Modular Measure have been a major factor in delaying adoption by individual firms. The greatest lesson to be learned from the respondents is that each office must assure acceptance by all those employes affected and must plan adequate indoctrination of those who are to put the new procedures into practice.

useful in co-ordinating unit sizes of materials

Dissatisfaction with spotty availability of Modular-size building materials was expressed in the architects' comments. Manufacturers' difficulties in developing Modular-unit sizes were not appreciated. Reports on material sizes echoed others' comments with regard to drafting and detailing (above) to the effect that Modular-size exterior doors cannot now be found, are urgently needed.

makes possible tighter cost-estimates

This claim was not substantiated by response received. Such matters are hard to gage in any case and the lack of comment would imply that architects using Modular Measure are as yet unconvinced on this score. However, in addition to the few responding affirmatively, a few others predicted that this will be the case, some day. Negatively, none seemed to think the new mode of dimensioning causes less-accurate estimates.

quicker layout of the job at the site

Modular Measure makes possible radical simplification of dimensions at the foundation level. Except in rare instances, fractions of inches can be avoided completely: often, all layout dimensions can be multiples of the 4-in. module. This provided basis for the claim that the new method speeds job layout. Modular architects' experience seems to be mixed. Although layout can be greatly benefited by Modular drawings, this will depend on the familiarity of superintendent, foremen, etc., with the principles involved.

reduces masonry costs while improving quality

The masonry interests, who were the first to push the Modular-Measure idea, should be pleased by the preponderantly favorable comments received on this question. Architects further pointed out that nothing is gained unless Modular-size units are available competitively and unless the masons are acquainted with the system. Some appeared to doubt whether a mason of lesser skill could, through Modular Measure, produce work of quality equal to nonmodular masonry laid up by a superior journeyman without the benefit of modular dimensioning.

requires no compromises as to freedom of architectural design

It was to be expected generally that architects using Modular Measure would be convinced that this mode of dimensioning presents no conflict with their basic function as designers, and this proved to be the case. Conversely, one firm has declined to adopt the system as yet, partly because of a feeling that it can handicap design. An important comment received from several was to the effect that, if design considerations are more important, there will be times when the Modular method will have to be ignored. (Nonrectangular elements of a Modular building, for instance, would have to be dimensioned pretty much as for a nonmodular job. A few reference dimensions will suffice to locate them relative to the building grid.)

Furthermore, some architects pointed out that, if the "component-assembly" approach to design is being followed, Modular is a positive aid to good design.

Modular-drafting practice will undoubtedly evolve as more and more offices adopt this method. At present, a number of questions remain unanswered. One office queried: "When typical details are employed, should arrows, dots, or some other indication be used? Not all typical details are located within the grid set-up in the same position. Perhaps a simple note added to the standard instruction decal[3] could indicate the use of an arrow for all typical details, regardless of location." Another pointed out: We have a problem in dimensioning to odd (Modular-standard) brick courses, as we have not adopted dimensioning in *thirds* of inches and *sixteenths* do not total up to three courses in 8 in. We have thus found that the 4-in. basic unit is a fallacy for (Modular-standard) brick-faced buildings. The actual unit is 8 in., to keep brick coursing similar in equal stories. This means that story heights can vary only in 8-in. increments and, in many cases, this is impractical." Quite a number of offices have developed reference systems, based upon the 4-in. Modular grid, to cope with such problems of vertical co-ordination as the one just indicated, also to identify controlling elevations and to make it easier to find elements in plan.

The general conclusion that may be derived from the reports received is that claims of Modular Measure's benefits are largely true, but cannot be guaranteed in every case. It is a tool for achieving order, specifically in dimensioning, in the production phase of architecture. Dimensions and size considerations pervade this phase and efficiency can only be achieved through a multiplicity of improvements. Modular Measure can help in many ways, but is still probably performing almost at its worst—because of widespread unfamiliarity with (and occasional opposition to) the system and because of the dearth of Modular-co-ordinated materials with which to execute the Modular drawings. That this "worst" is found well worthwhile by a number of practitioners justifies faith in the new method. Specific comments, from individual architectural firms, on the preceding eight claims are presented (*page 266*).

One firm—Aeck Associates, Atlanta, Ga.—was good enough to set down a full report on its recent adoption of Modular Measure. The following was prepared by F. J. Bull (then of the Aeck firm, now partner in Office of Frank J. Bull, Architect, & John N. Kenney, also of Atlanta):

[3]*Instruction decals for working drawings are available from AIA Headquarters, Washington, D. C.*

case-history: converting to Modular

"In the beginning, there was the promise of Modular Co-ordination. The beginning, I believe, was in 1952 at a meeting of Georgia Chapter, AIA. A well-known architect, the prophet of Modular profits, along with Bill Demarest, gave an illustrated lecture on the benefits to be gained from the use of Modular dimensioning.

"We had always been impressed with the need for efficiency in producing complete and accurate drawings. Here was a method that met the specs! The only action taken, however, was to set up a file entitled, 'Modular Co-ordination.'

"The 1954 winter meeting of North Carolina Chapter, AIA, was a conference on 'Simplified Drafting Procedures.' In this we took part and told of our office practices, but there were the same two men as before extolling the virtues of Modular Measure. We began to think more seriously about it.

"At the time, we were doing a good volume of school work. We discovered that all of the materials were Modular! There were jumbo brick and concrete block; standard-size steel, projected windows; and 4-in. steel columns and beams in 8-ft bays. Everything was Modular except the architects and the drawings. Although they may not have been real, there seemed to be many reasons for keeping the *status quo*. Most of these buildings were in rural locations and built with local labor which would not be familiar with the system. Budgets were very low and bids had been coming in right. Perhaps Modular would cause a cost increase that we could not stand. Then, too, there was the inherent fear of the unknown. We stayed with the old system of dimensioning.

"We had, however, become convinced that we should try the new means of dimensioning and we told ourselves that we were only waiting for the 'right building.' By definition, we meant a project with a good budget figure, a project not too large, one rather simple to do. It would come along at just the time 'when things get back to normal in the office.' Our apprehension revolved around time schedules, remarks of other architects who claimed some bad experience with Modular, and the position held by the joint AIA-AGC Committee, which was to

hold the entire subject of Modular Measure in abeyance until there was a general acceptance throughout the industry.

"A year and a half later we thought we saw the proper opportunity to use Modular. It was a small professional office building for seven doctors.

"Financial arrangements and budgeting were meticulous and endless. The clients employed a firm of CPA's to work out all angles and aspects of their proposed investment. Of course, the heart of this work was the estimate of the building cost. In panic, I guess, we sent a letter to all bidders, enclosing reprints from the January 1955 *Constructor*, official publication of the AGC. This reprint had lavish praise of the advantages of the Modular method.

"It was only several days later that we received a letter from a general contractor who was bidding. He had never heard of the Modular system before and had settled down to the usual two weeks of 'take-off.' After exactly three days he had finished all quantity take-offs and had subs all lined up. He stated that it was the easiest take-off and the most accurate that had ever come through his office. On bid day, the contractor who had written the letter was low bidder with a proposal 3/10 of 1% less than the budget. The spread of bids from low to high was 4½%. It was not all silver lining, however, for the doctors then agreed to disagree—and the building has never been built.

"Change-over from standard dimensioning to Modular dimensioning appears as formidable as establishing a new practice. There are many factors involved, many unknowns. Others have done it with success; and finally we decided that we could do the same. In considering the problems, take them one by one, as they come up in a normal project: design, detailing working drawings, engineering supervision, and shop drawings.

design

"From the standpoint of design, the common misconception is that Modular Measure is bringing automation to architecture. Nothing could be further from truth. The design process is unchanged and Modular will not relieve the designer of responsibility for what he does, whether good or bad. It is perhaps most important for the designer to understand the uses and limitations of Modular in order to overcome any fear of it.

"A disciplined design establishes a design module which is related to the structural bay. All that Modular asks is that this be related to the 4-in. detail module to achieve the best results in the use of materials. From there, design freedom is unchanged. Our experience is that design suffers less during detailing and results can be better, because now the designer and the detailer will be thinking along the same lines and using dimensions which spring from the same basis.

modus operandi

"A keen interest in developing and polishing our methods of presenting complete and accurate information on our drawings has resulted in a *modus operandi* which may be peculiar to this office. We call it the Tee-Up and, since I shall refer to it again, a short explanation is required. The Tee-Up has developed not only in the interest of efficiency, but also as a matter of flexibility in the use of a small drafting force to produce a moderate volume of work.

"The Tee-Up begins with well worked out preliminary design drawings. During the first phase of working drawings, only one or two men are assigned to the job. They work up freehand details completely and accurately for the entire project. Next the working-drawing sheets are laid out at quarter-size and each drawing is assigned a position on a sheet and given a reference number. When drafting begins, any number of men can be used, as each sheet is complete and cross referenced. A sort of bulldozing occurs, with a full crew drafting the fruits of the Tee-Up; and the drawings are completed in a rather short time, ready for checking. Meanwhile, the next job is being Teed-Up. With this method of operation, the insertion of Modular Measure affected only two men in the first few weeks of the first job. They were the only ones in the office who understood the "square bubble." The working familiarity gained by these two men during the Tee-Up process made it quite simple to explain the system to the rest of the men in the office.

detailing working drawings

"It is a fact that the key man in the whole process is the one who sets up the governing wall sections and details and so establishes location of the building within the grid. If this is done with understanding, the solution to many problems becomes almost automatic. It seems certain that our Tee-Up process was a fortunate complement to the use of Modular Measure.

"As the final drawings progressed, the draftsmen quickly learned the basic elements of this system by drawing from the freehand details. The chief difficulty experienced at the outset was in terminology. There appear to be Modular, nominal, and actual dimensions—a module, a grid, a reference dimension. Even conversation is nerve racking and there is much wasted motion in distinguishing the nominal from the actual and in mis-using the words 'grid' and 'reference.' It is only through experience that this confusion is eliminated.

"One of the aids to Modular Measure that we use is the grid or cross-section paper for the detail sheets. The grid is printed on the paper in light blue that does not print, unless it is picked up with a pencil line. The grid may cause some confusion in locating a drawing on the paper, but becoming accustomed to it speeds up drafting, as it partially eliminates the need for scaling every dimension. The tendency is to draw in too many grids and to give unnecessary dimensions in tying things down to the numerous reference points that are available. Here, again, it is experience that counts, as it is with any system for dimensioning. Prior to Modular, it had been our custom to do most detailing at 1½-in. scale. With Modular we find it is faster to draw and reference at 3-in. scale.

"The importance of the arrow-and-dot convention and its usefulness was to be profoundly impressed on the draftsmen. Invariably there is confusion in expecting a direct relation between dots, arrows, actual and nominal dimensions when, in fact, there is no direct or implied connection between any of the terms. The convention, however, makes it very simple to scan a drawing and locate the controlling grid lines. Then, knowing the standard clearances or reference dimensions of the various materials, one can read a plan and translate it into details in a way that is quite similar to reading a foreign language and thinking in English.

"Although there are several drafting aids specifically made for Modular Measure, the only one we have used in addition to the grid paper is the standard 'Stanpat Appliqué' which gives the explanation of Modular Measure. This is located at the top-right corner of the cover sheet for the information of the contractor.

"Masonry scales become an unnecessary item of the past. It is simple and fast to think in terms of 4 in.—and three courses equal 8 in. A rule of thumb we have used is 'Even eight, odd four; opposite plus 1⅜ in.' This is a statement, in essence, of the fact that 8 in. is divisible into even feet, even feet plus 8 in., and odd feet plus 4 in.; and when three courses equal 8 in., coursing falls on the opposite conditions plus 1⅜ in. That is, for example, 6'-4" + 1⅜" or 6'-5⅜", and so on.

engineering

"Professional consulting engineers help us on all of our work. The electrical and mechanical engineers have not been greatly concerned with our use of Modular, except in localized and specialized conditions. In these fields, the effects and advantages appear during construction. Modular Measure is of great importance in structural engineering, however, because of dimensioning. Beginning with the top of the footing and location of walls and column faces on footings, the use of arrows, dots, and reference dimensions is as important in the structural drawings as in the architectural. The peculiarities involved are basic and simple. Required tolerances and connections with other materials are usually handled with standard reference dimensions. Engineering design, of course, is based on actual sizes, and this can become a point of acute consternation on the part of the structural engineer. With the standard ½" reference dimension, a nominal 12"x12" concrete column is actually 11"x11". The dimensions for reinforcing steel are not affected, in general, and are all actual dimensions. So here is a combination of facts that makes it paramount to have accurate detailing on the drawings and thorough understanding on the job. Admittedly, it is a little different from wood construction where 2"x12" is also a nominal size.

"With the complications attached to architectural details, the 3-in. scale is justified. Often structural details can be shown at much smaller scale, ⅜ in. or ¾ in. The necessary grid lines and reference dimensions can be exaggerated out of scale for clarity. Requirements are simple and generally need only one or two grids to explain a structural detail. The engineer, however, must have thorough understanding of the system in order to read the architectural drawings correctly and to make proper use of the dot-and-arrow convention.

"The engineer questions the advantages of Modular in his practice, stating that it complicates the scheduling of beam and column sizes and reinforcing, and increases drafting and checking time due to the required additional details to explain references to grid lines. With added details there is also the chance of additional error. Another difficulty which will be explained below concerns shop drawings which are not submitted with Modular dimensioning.

supervision

"The last phase of a project over which we have complete control is supervision. Customarily, all of our work is supervised by one full-time field supervisor. To be completely candid, we dealt rather lightly with this particular phase until it cost us some job mistakes. It is now evident to us that the usage in the drafting room affords tremendous opportunities to learn the applications of Modular Measure which are not available to the man in the field. Time is required for experience to breed confidence, but with the supervisor this is a disadvantage. A further complication is the transition period with both dimension systems under construction. For us, this period is still in progress. In the drafting room, the experience of seeing mistakes made and corrected, and the opportunity to adapt basic principles to new and varying conditions, is like learning a foreign language by living with it. A detailed explanation to field supervisor is not equal to this experience. Therefore some bridging method must be used. To achieve this we have had office personnel visit the job site with the supervisor to explain the system with particular application to the job at hand.

"Our first job to be completed under Modular Measure was the Headland High School in East Point, Georgia, an Atlanta neighbor *(acrosspage)*. Upon award of the contract, we were delighted to hear the contractor state that he had a working knowledge of Modular Measure from previous experience. Our happiness was short-lived, however, when we discovered his experience had been with that worst-of-all modular fault—a job that is Modular on the outside and actual on the inside. The contractor and his superintendent were invited to the office for a period of instruction. It apparently had truly little effect in building the confidence of the superintendent, who claimed that the new system could not be trusted with the men under him. Innovations required in job layout seemed to be insurmountable obstacles.

"The construction moved along smoothly, however, and we soon began to keep a diary of comments by the superintendent as he discovered what he called 'lucky breaks.' One of his luckiest days was when he discovered that the masonry coursed both directions around openings with no cutting and, furthermore, coursed from slab to slab with no odd joints. He was truly excited when he discovered that he could start a mason almost anywhere on a wall—as many masons as he pleased—and the work would course out. On one occasion, the plumber was locating sleeves on the concrete forms with reference to grid lines, which he picked up from the ⅛-in. plans, with the help of the arrow-and-dot convention. Completely unnerved, the superintendent proceeded to check the plumber's work by adding up long strings of actual and fractional dimensions, only to find the sleeves properly spotted. After this, when an electrician located panel boxes without using fractional dimensions, the superintendent just stood to one side with arms folded and a scowl on his face.

"With respect to job lay-out, it became obvious that architectural details assume far more importance with Modular Measure than otherwise. The carpentry foreman stayed in trouble until he learned to consult the details for the key reference dimensions. It appeared that he was accustomed to working without the help of details at all.

"We have had our greatest difficulty with shop drawings. As yet we have not included a specification requirement that shop drawings must be submitted on

Modular Measure. Because the manufacturers of building materials have been the chief sponsors of Modular, this should not be necessary. There appears, however, to be a great need for education of the manufacturers' representatives. During development of the working drawings the representative of a large manufacturer of windows, whose catalog features the grid and Modular dimensioning, was much relieved to learn at last exactly what the red lines on the catalog details were for. With good humor we took this occasion to give another short course in Modular Measure.

"When construction began on the High School we urged the contractor to require shop drawings to be Modular for his own benefit. Reasons stated were for simplification of the work for everybody and because the materials used were Modular in size. There was a prompt refusal of this suggestion by the manufacturers themselves, who claimed their shop workers were not familiar with the system and they feared many errors in fabrication. Furthermore, their drafting departments were not familiar with it and they felt there was not enough volume at the present time in Modular Measure to warrant any changeover. Inasmuch as the responsibility for co-ordination of dimensions of all materials and equipment rests with the contractor, we have felt that the urgency of requiring Modular shop drawings also rests with the contractor. During construction, who could reap more gain?

conclusions

"The approach we have developed toward Modular Measure is that it is a tool to be used, just as a compass is a tool. The more we use it, the more skilful we become. Standard details in catalogs and reference books are things we study, but do not copy. The complexity of a detail depends on design requirements, and so our details may bear no resemblance to the standards; but the principles are the same and the advantages are still there. Drafting costs appear to be improved due to accuracy and the ease with which drawings can be checked.

"The effect of Modular on the cost of construction is something on which we have no evidence in either direction. The buildings appear to cost neither more nor less, whether we use Modular or not. However, reports from other parts of the country, where its use is more common, indicate a price advantage for Modular. This could be an important factor in determining whether to use the system, and it is conceivable that some day clients will demand it. When that happens, we will be there.

"The importance of the degree of acceptance of Modular must not be underestimated.

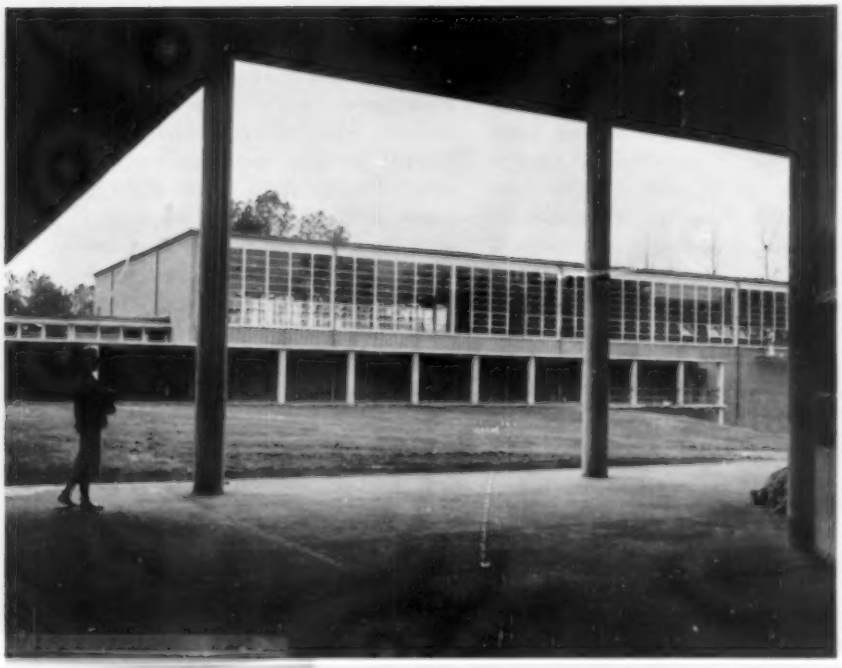
"Contractors in our area are either noncommittal or opposed. Quite apart from the lack of volume of Modular, which causes unfamiliarity, there is a certain amount of closed-mind attitude. This may be due to lack of information, erroneous information, or a terrifying experience with the half-Modular job. Many architects also appear to be misinformed or not informed at all. Often one who is outspoken against the system has tried a timid approach, an attempt to change over bit by bit. The resulting confusion is enough to make anyone vow to leave the stuff alone. For success with it, it is necessary to be completely Modular throughout the drawings.

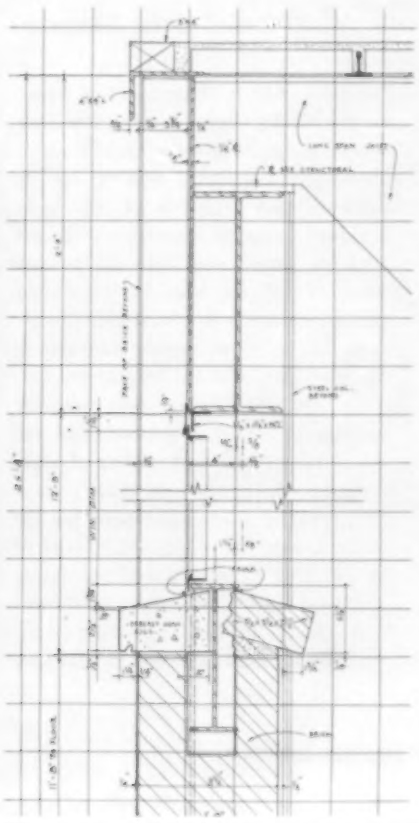
"Since the continued use and development of the entire idea is dependent upon acceptance by owners, contractors, architects, and manufacturers, it would appear that there is still a great amount of work to be done along the lines of informative promotion. Either this or the dire necessity to use all means to restrain building costs, I believe, would cause rapid and complete acceptance.

"As a former air-line pilot, I cannot help comparing the rapid change and giant strides in air transportation and its traffic-control methods with the ponderous inertia that must be overcome in order to move the building industry step by step. Is it really inertia—or only complacency?"

Headland High School, East Point, Ga. Architects: Aeck Associates. This Modular-Measure brick school was built and furnished for $11 per sq ft.

Photo: Floyd Jillson





Modular Measure: its role in architectural education

As observed in the foregoing, Modular-trained draftsmen are very scarce. The proposal has often been made, since the earliest days of the effort to bring Modular Measure into general use, that it should be taught by all schools of architecture. It is argued that students, not wedded to traditional practices, would readily appreciate the worth of the new system. With the passage of "x" number of years, these same students would become dominant in the profession and Modular Measure would thereby be universally employed. That premise seems logical and, if it had been put into effect in 1945 when the system was first presented to the building industry, it might already be starting to take effect on a large scale. One question, though: How to convince the schools themselves that they should include this strange, new procedure in their courses on materials, construction, and drafting?

No survey has been taken, but it is probable that only about half a dozen of our architectural schools regularly train students in Modular Measure, in the sense of augmenting instruction in the method by actually requiring a certain number of Modular working drawings and details. Possibly another two-dozen schools indoctrinate students in the principles involved, without introducing them to specific Modular materials or instructing them as to the preparation of Modular drawings.

In past years, one likely deterrent among architectural educators has been some doubt as to the ultimate acceptance of Modular Measure by the building industry. A consideration that should encourage its inclusion in architectural curricula is that it offers a useful tool to help bridge the gap between pure design and the practical, "nuts-and-bolts" construction of an architectural design; as opposite sides of the same coin, either suffers if isolated from the other. Harold D. Hauf, Dean of Rensselaer Polytechnic Institute's School of Architecture, has expressed it thus: "We have no course in modular drafting, nor do we expect to have, since we feel that the concepts of modular planning and co-ordinating dimensioning for details should be instilled in each student as a part of his general thinking. We weave both concepts, and some details, of modular drafting into our first-year course in architectural drawing. This work is carried further in our second-year course in building materials and construction. Although mindful of the difference between Modular Measure and modular planning in general, we nevertheless attempt to unify the two ideas and show that Modular Measure (based on the 4-in. Module) is a logical sequence to modular planning. We find that the 4-in. Module for detailing does not become such a revolutionary idea to students who already know about modular planning. If one accepts the larger planning-module, particularly for items such as curtain-wall construction, it becomes very logical indeed to take advantage of the same concept in detailing the units."

The following report was contributed by Assoc. Prof. Melvin W. Isenberg of the Department of Architecture. The Pennsylvania State University, where preparation of modular drawings has been a regularly required part of each student's training for a number of years.

case history: teaching Modular

"Every student in Department of Architecture at The Pennsylvania State University is made familiar with Modular Measure, its history, reasons for its existence, and its use in practice. This has been going on continuously for the past six years, ever since we became aware of the great need for introducing the system into our educational institutions in order to expand the use of Modular Measure in actual practice. Since the manufacturer will normally produce to satisfy a demand, and the contractor will build according to plan, it must be the architect to whom we turn for the spark which will expand the use of the system. We utilize this conviction by instilling in the minds of our future architects and engineers a clear and unmistakable picture of the real advantages of Modular Measure, so that they can introduce it into offices when the opportunity arises.

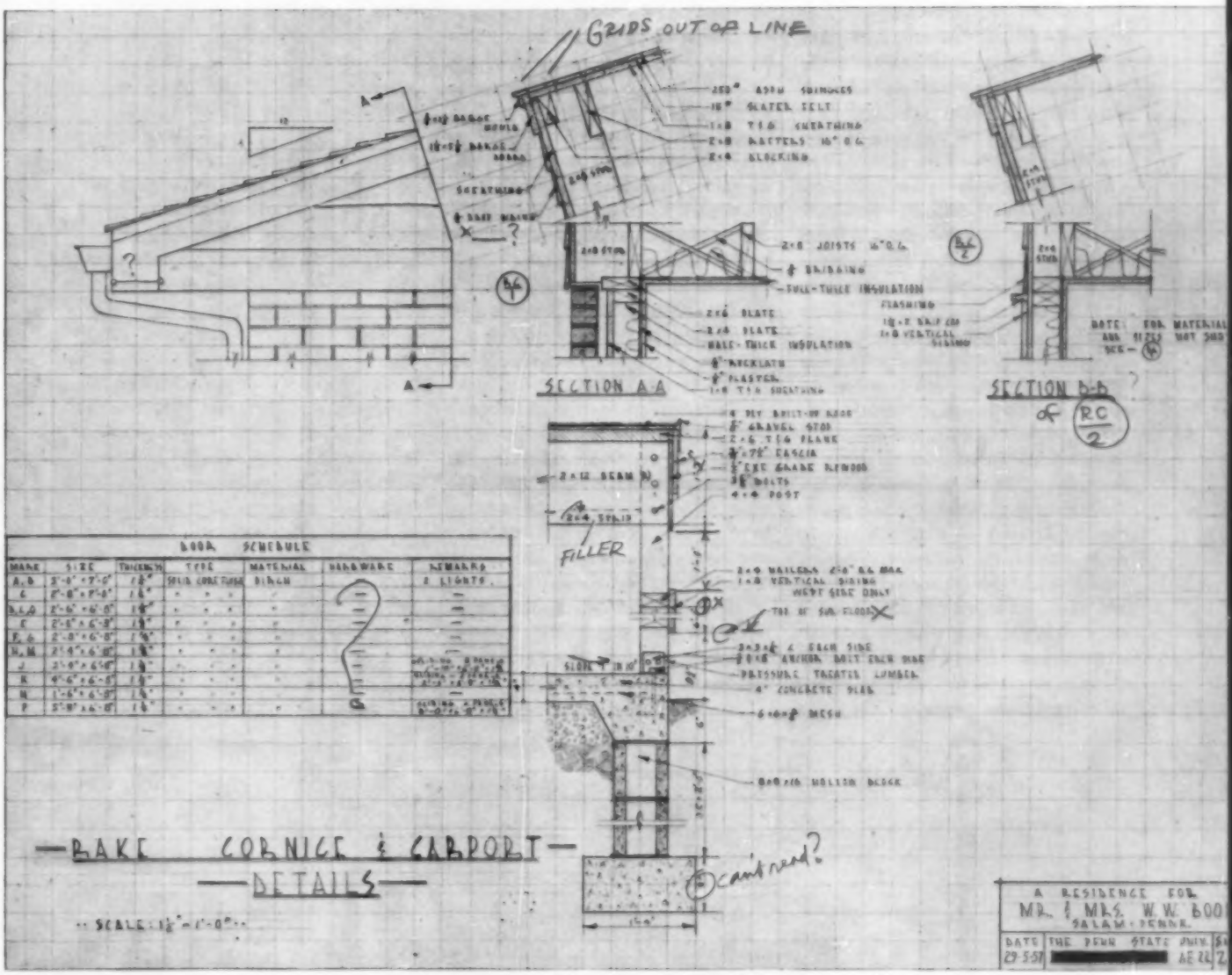
"I should like to describe how a typical student is instructed in the preparation of architectural working drawings. He normally has had no previous experience in an office or on a construction job. Therefore we must start from the beginning. First, he schedules a course in materials and methods of architectural construction during his third semester. This course consists of approximately 25 clock hours of lecture-discussion, a small part of which is devoted to the philosophy of Modular Measure so far as it relates to the manufacture of the product, and to the assembly of the materials. Modular is compared with nonmodular by illustration and examination of actual products. The student is usually convinced of the need for an expansion of the system as the advantage of truly Modular materials become apparent.

"It has been found that the alert student must be 'sold' on the idea of Modular Measure. We use an assortment of devices to help convince him, among which devices are excerpts from such publications as *Grid Lines*, specimens of Modular working drawings, manufacturers' catalogs, slides by member-companies of the Producers' Council, and other illustrative material. We have prepared a number of 35-mm slides which are used to good advantage in this "selling" task. The student is thoroughly impressed when he sees what can be done in the drafting room: a clear and legible floor plan of a large and complicated building drawn at 1/16-in. scale.

"It is in the Working-Drawings course of his fourth semester that our student

first puts to use the principles of Modular Measure. A small residence is usually selected for the problem, and preliminary drawings are worked out prior to the start of the course. The preliminary sheet is examined carefully and over-all dimensions are accepted or changed where necessary to accommodate Modular materials. It is highly improbable that such a house would ever be built, for the greatest possible variety is incorporated into the structure in order to give the student the maximum possible experience in the limited time available. We try to use some frame walls, some solid-, cavity-, or veneer-masonry walls, a stair, a fireplace, and at least three different kinds of windows in each house. No major changes are permitted during the progress of the course, but the student is permitted and even encouraged to change the house in minor respects. This is the manner in which he may exercise originality without deviating too far from the general problems considered in group discussion.

"For the first third of the course, the student develops his details on what we



call 'work-sheets.' Periodic tests are given to drive home construction principles and to uncover weaknesses in the teaching procedure.

"After the student has become familiar with the process of making the drawings, usually a third of the way through the course, he is encouraged to work directly on his final drawings without going through the 'work-sheet' stage. These drawings, too, are submitted for checking and then returned to the student for correction *(example on preceding page)*.

"The final set of drawings, consisting of seven to nine 18" x 24" sheets, is submitted at the end of the semester and examined in detail. Corrections are again noted and the papers are returned to the student. Slower students must find some extra time outside of scheduled class periods to complete the minimum requirements. Faster students are encouraged to prepare details, such as kitchen-cabinet layouts, not required of all. It has been our experience that superior work from the students has been a satisfying result of this method of teaching.

"In succeeding semesters, the student is not compelled to use Modular Measure in any of his submitted work. There is an occasional design problem where he applies a larger planning module, a multiple of 4 in. He may, and frequently does, voluntarily use Modular Measure in details accompanying design problems. Very often, the Fifth-Year-Thesis problem is executed on a Modular basis, again without any compulsion, but because of a conviction that superior details will result. We have no statistics at present to determine what happens after the students graduate and start working in offices. It is still too early to arrive at any valid conclusions concerning the effectiveness of our program, but we sincerely hope that our graduates continue to be enthusiastic proponents of Modular Measure.

"My experience in teaching Modular Measure at Penn State has convinced me of a number of things which I can summarize as follows:

"1. *It is primarily a selling job* and, in order to sell the student, the instructor must first convince himself that Modular Measure is well worth the effort.

"2. *Modular dimensioning will take no more time initially* than the more conventional approach and will actually require less time later on, or will permit greater coverage in the same time.

"3. *There is the potential danger of the student becoming a slave to the method,* but if he is constantly reminded that deviation from Modular dimensioning is not only permitted but desirable at times, this danger need not become an actuality.

"4. *The student will develop a clearer understanding of details* and be better equipped to create original details by this method.

"5. *Drafting is generally improved,* principally in line contrast.

"6. *Accuracy is improved many-fold* with far fewer errors in dimensioning.

"7. *The instructor's task in checking drawings is made much easier.*

"8. Lastly, and perhaps most significant of all, the *teaching of Modular Measure in the curricula of the architectural schools will probably do more than any other single thing toward expanding the use of the system.*"

Modular Measure: future prospects

The entire foregoing discussion revolves about the question: "Is Modular Measure worthwhile, either for the building industry at large or for the individual architectural practitioner, or both?" Its aims, of course, are wholly admirable: reduced building costs, better-integrated design, speedier production, fewer mistakes in dimensioning. But, admittedly, present performance does not attain these desirable goals. Each must judge for himself, weighing ultimate advantages against present obstacles. For architects, the immediate benefits are beginning to become apparent; yet, not all architects become convinced at the initial attempt to use the system. Some commentators say that Modular Measure is inevitable, in view of the present industrialization of building. It is hoped that this report will assist the interested observer of "modular" progress in forming his own judgment as to the real promise of the new method, from his own viewpoint.

The prospects for acceptance of Modular Measure throughout U. S. building improve constantly as, one by one, steps are taken in that direction. The trade press is continually reporting such developments as sponsorship of the modular effort by the general contractors' group (the AGC), adoption of the system for certain large Corps of Engineers construction programs, the requirement of Modular dimensioning in a couple of revised Federal housing titles, the advent of new types of building components in Modular sizes. Cumulatively, these steps become significant.

I, for one, am convinced that—barring the sudden development of a different, and patently better, mode of orderly dimensioning—Modular Measure will gain acceptance at an increasing rate. Constantly used by many people, it will surely be refined and revised, until it may some day evolve into a system far removed from that presently practiced. Our measuring tapes, for instance, may come to be marked—after the first foot—simply in increments of the 4-in. module. Jigs for panels, etc., may be made adjustable on a similar basis.

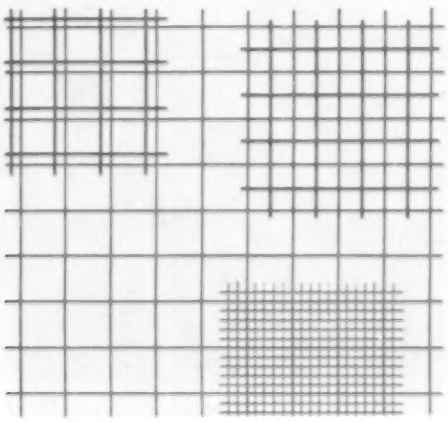
This conviction springs less from noting the publicly announced developments implying a trend toward industry adoption of the system than from observing that a heavy percentage of *practitioners* already find it worthwhile. Despite present difficulties, architects, contractors, and the materials manufacturers who follow Modular Measure like it and want to continue using it.

"When?," not "whether?," becomes the question. The factors hindering acceptance of the system have been mentioned above. In contrast to such negative considerations, there are, in my belief, two most promising directions for "priority" efforts in the over-all Modular-Measure program. One is the development of a much wider variety of Modular-size building units. It is true that the manufacturers launched the program to begin with, but they have necessarily been neglected while an all-out campaign was being waged to convince architects that they should give Modular dimensioning a try. Now, with the architects becoming enthusiastic, it is vital that work be resumed with manufacturing groups (under the auspices of American Standards Association, whose Committee A62 is the official arbiter of Modular procedures and sizes). There are indications that many such groups are eager to work out Modular sizes for their products, when the "A62" program is reactivated.

Just such activity is now in the making, with the appointment of the vigorous "Mr. Modular Prophet" Silling as Chairman of the ASA committee A62 and the recent creation of the Modular Building Standards Association, which Silling heads as president. Let us hope that, in as short a time as a couple of years, Modular building units will begin to appear in quantity and diversity.

The other opportunity for most effective effort in facilitating the conversion to Modular lies with the schools. Most already advocate employment of planning modules in design; as has been indicated, Modular Measure is closely related. Indoctrinating all student-architects in Modular dimensioning would not be of immediate significance, but its long-term effect would be assured. Architectural educators have an obligation, not only to practicing professionals, but also to the students themselves, to familiarize these architects-to-be with modular principles and applications. Their awareness of this, I am informed, is growing; it is to be hoped that soon, all schools will teach Modular Measure.

The idea proposed by Bemis in the 1930's, the logic of which was widely endorsed in the 40's, is known throughout the industry to have proved itself in actual practice, albeit on a limited basis. Much still remains to be done, but the principle today is practically assured of universal acceptance. I am now confident that its aims will be achieved because the industry has, by and large, become persuaded that – as Modular Pioneer Bemis wrote in 1936 – "Not only for the manufacturer, the industrialist and the engineer, but for the architect as well, does the 'cubical modular method' offer a solution, a resource, and a tool."



Modular Building Material Sizes by Harold J. Rosen

Modular Measure in the drafting room enables the architect to produce more concise working drawings, makes for more clarity in presentation, and should reduce the time spent in the actual preparation of drawings. During the construction phase, Modular Measure should simplify the work of the superintendent and foreman in laying out the job on the basis of the established module, which eliminates fractional measurements. However, the greatest savings in construction costs can accrue from the use of modular-size building materials, when used in conjunction with modular drawings.

While building material sizes have been standardized, only a small number have been standardized on a modular basis. This results in a waste of materials due to cutting and fitting and in an increase in construction time in order to fit building materials into the plan.

The specifications writer can only draw on a small segment of the materials being manufactured today which can be used in connection with modular drawings. Recently, however, the Modular Building Standards Association was formed under the joint sponsorship of the American Institute of Architects, the Associated General Contractors of America, the National Association of Home Builders, and The Producers' Council, Inc. One of the goals of this new association is to standardize building materials and products in conformance with the four-inch Module. Thus all building materials and dimensions would be in four-inch sizes or multiples thereof. Such an arrangement would permit the specifications writer to specify materials which will fit into drawings that are Modular.

While some architects and workmen in the building construction industry are conservative and reluctant to change from the present system of fractional dimensioning, it is hoped that through an extensive educational process the benefits of modular co-ordination will become apparent to them. It is the manufacturer of building materials who will bear the brunt of the costs involved of change-over from present standard sizes to modular-standard sizes. This change in building-material sizes cannot be accomplished overnight and the cost of this change may have to be carried over a period of time. One of the savings to manufacturers may be in the fewer sizes that may be required due to the new module.

There exist today certain materials and products which are being manufactured in modular sizes. The American Institute of Architects, through its Modular Co-ordination Office, compiled a listing of these products together with the names of their manufacturers in a booklet, *U.S. Directory of Modular Building Materials*. For the most part, these materials are masonry, concrete, and clay products of brick and tile. It is quite obvious that unless these basic masonry materials were manufactured in modular sizes the concept of Modular Measure would simply remain a theory. In addition to masonry products, the AIA directory contains the names of manufacturers of glass block, aluminum, steel and wood windows, toilet partitions and metal equipment to fit into modular masonry, such as dampers, ash doors, vent louvers, and fire extinguisher cabinets.

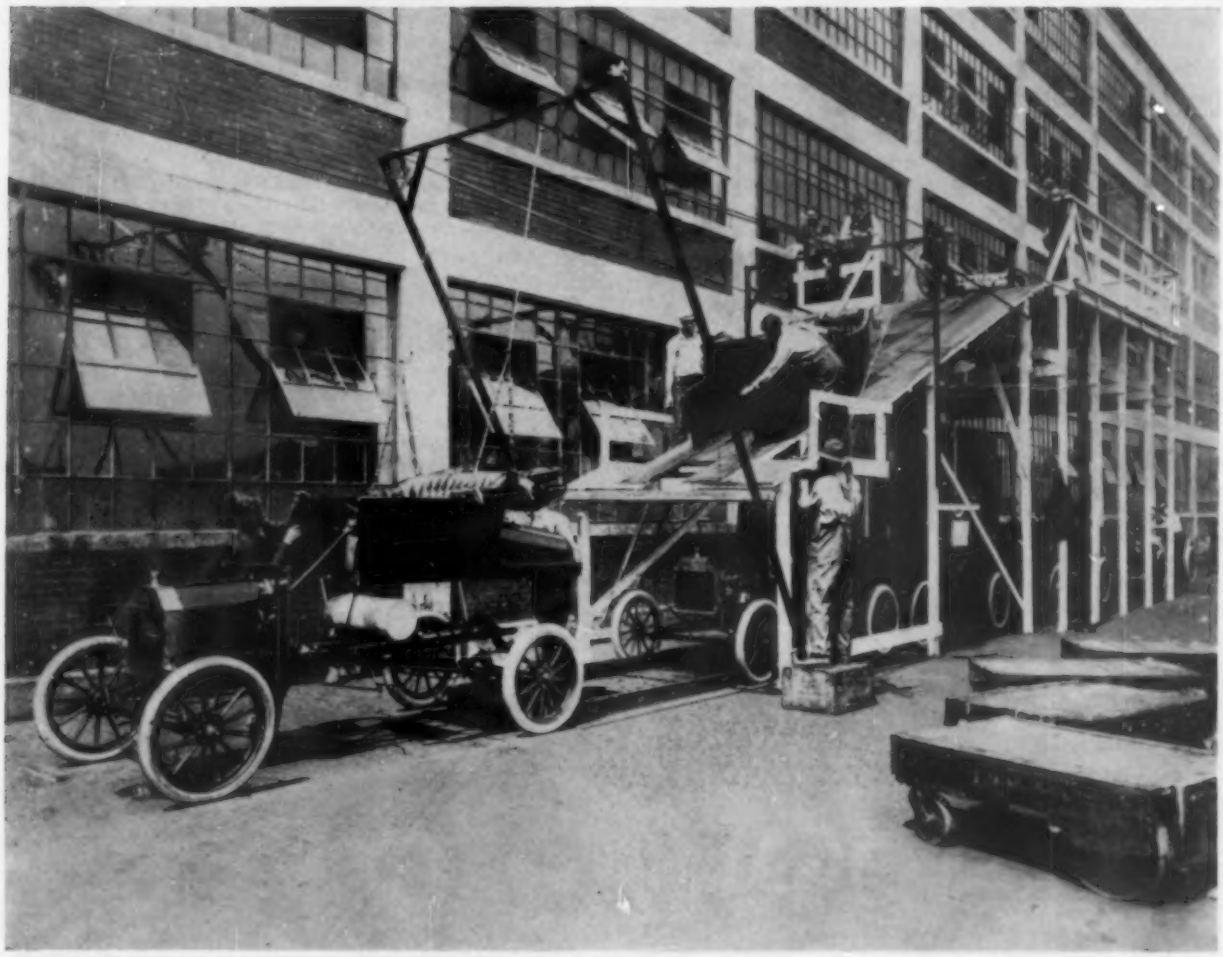
Some manufacturers have standardized their product sizes on a modular unit which fits the 16″-o.c. stud spacing used in wood-frame construction, such as wallboard, plywood, between-stud insulation batts, and built-in units, such as medicine cabinets. There are many more materials, however, which are not integrated on the four-inch Module. These include ceramic tile, resilient floor tile, built-in heating units, doors and frames, etc.

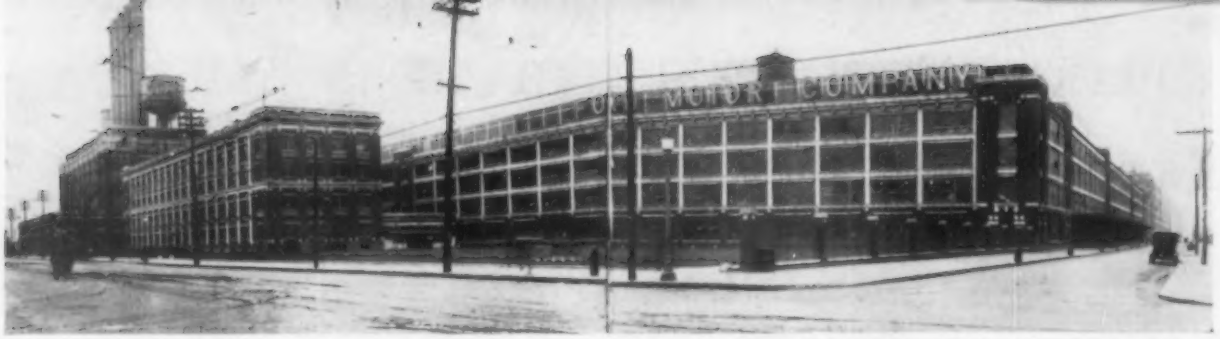
The architect, manufacturer, and specifications writer must see to it, however, that in scaling materials to be used in the four-inch module, allowance is made for thickness of mortar, calking rebates, and expansion joints — so that all component parts can fit into the Modular grid. As an example, the modular concrete block is 15⅝″x7⅝″x7⅝″ (nominal 16″x8″x8″) which fits into the four-inch modular cube, since the mortar joint is ⅜″ thick and takes up the remainder of the space. Between-stud insulation batts for a 16″ o.c. 2″x4″ stud spacing are approximately 15″ wide, to fit into the actual space remaining between the studs.

Some cutting, fitting, and adjusting is necessary today in order to make the design work out to the fraction of an inch that may be required in order to achieve a clean-cut result. It is hoped that modular co-ordination — that is, modular drawings plus modular building materials — will cause such problems to arise less frequently. In the final analysis modular co-ordination should cut the costs of building construction.

PROGRESSIVE ARCHITECTURE IN AMERICA

FACTORY FOR FORD MOTOR COMPANY—1909-1914
Highland Park, Michigan
Albert Kahn, Architect





The miracle of the automobile and its mass production has been called "one of the most astonishing mechanical conquests ever made by man." Equally remarkable were the buildings designed to house automobile production in the early days of the industry. After the 1905 reinforced-concrete plant for Packard Motor Car Company, advances in factory architecture were rapid and revolutionary, largely due to the fortunate concurrence of two exceptional men of the age: Henry Ford and Albert Kahn. Ford's vision and courage, his willingness to experiment, his dedicated search for newer and better ways to increase production efficiency, have become an American legend. His unprecedented ideas made almost incredible demands on men and machinery. Consciously (and unconsciously) he forced technical innovations and developments in structure, design, and plan to accommodate his manufacturing advances. These demands were met—with the imagination and speed characteristic of the Ford operations—by Albert Kahn and his associates, in collaboration with Ford's own engineers. The Highland Park plant, begun in 1909, represents the first architectural realization of Ford's planning precepts, and, as such, is a notable industrial monument.

Although this factory was to become celebrated as the scene of the final development of the moving assembly line, an advance that did not take place until 1912-13, the design was clearly conceived in terms of mass production. As Allan Nevins and Frank Edwin Hill have pointed out in their definitive work, *Ford: the Times, the Man, the Company*, mass production is much more than quantity production, involving "the application to the manufacture of a given article of a half-dozen factors—simplification of design, standardization of parts, precision machinery, carefully timed speed, continuous motion, and use of the most ingenious labor-saving mechanism." Henry Ford defined it as "the focussing upon a manufacturing project of the principles of power, accuracy, economy, system, continuity, speed, and repetition." The great contribution of Ford Motor Company, according to Nevins and Hill, "lay in an expert combination of all these features."

It was inevitable that this revolutionary technology should create a new architecture. Since the beginning of the century, a number of automobile plants had been designed around an orderly arrangement of foundry, machine shop, and assembly rooms—organized for a systematic progression of work. The primary plan requirements for such factories dictated a continuous, flexible flow of materials and processes, with the layout following the product from raw material to finished article. The role of the architect was to devise whatever structural innovations were necessary to house the all-embracing plan. Kahn solved the problem with a carefully organized reinforced-concrete container—an enclosure remarkable for the revolutionary simplicity of its engineering efficiency. To aid the flow of production, Ford insisted, contrary to the current practice of putting separate functions in separate buildings, that all departments be unified under one huge roof. Courts, conventional catchalls, were covered with glass and utilized as work-areas. He urged the architect to admit a maximum of light and air to create optimum working conditions for the execution of precision work, and Kahn opened the walls with more than 50,000 square feet of glass, set in the first industrial steel sash imported from England for this purpose. A "tremendous building, almost as light as outdoors," the original Highland Park plant is a four-story structure, 865′ x 75′. Behind it was a one-story machine shop, 840′ x 140′, with a saw-tooth roof. Between the two was a craneway, 860′ x 57′. A transverse craneway entered the shop. By 1914, additional buildings filled a sixty-acre tract. No previous plant had been as advanced in its design as this layout of huge, open, manufacturing and assembly areas, with provisions for continuous, mechanized operation as part of the architectural scheme. Construction was entirely of concrete, steel, and glass; the reinforced-concrete skeleton forming the visible exterior framework, filled with the brick spandrels and steel-framed glass that have become a standard formula of contemporary factory design.

Appearance, as well as structure, concerned the innovators of this industrial architecture. Albert Kahn's own writings continually emphasized the morale and prestige values of a handsome factory. His brother, Moritz Kahn, summed up the new esthetic in 1917: "Factories should look like what they are—factories and nothing else. For effect, they should rely on the straightforward expression of their structure, on mass, and on the skilful disposition of their parts. . . ." However, he was not against "a decorative main entrance," a "rich cornice," or "a few ornamental features judiciously placed on the elevation. . . ." Such vestigial academic details occur on many Kahn factories over a surprising number of years, the only residue of "architectural embellishment" on the century's most progressive designs.

ADA LOUISE HUXTABLE

Special assistance from Frank Edwin Hill and Robert D. Kozlow is gratefully acknowledged. Sources and photographs: Albert Kahn Associates; Ford Archives.

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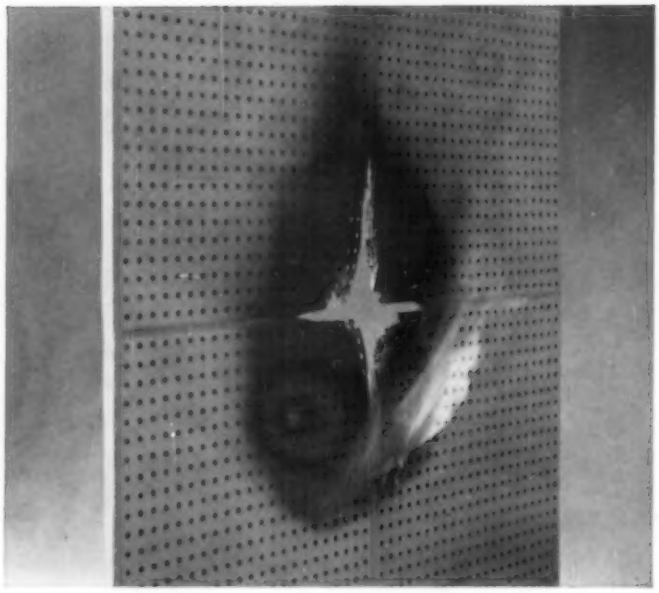

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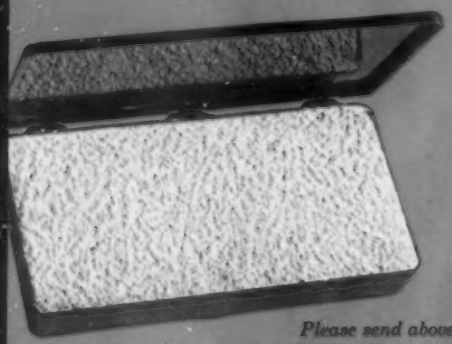

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A.I.A. File No. 39-B

To assure a thorough and expert presentation of the subject of MODULAR ASSEMBLY as applied to interior design, we invited Gerald Luss, Vice-President in Charge of Design, Designs for Business, Inc., to write on the subject for us. His, and his pioneering firm's, specialized experience in the use of (as well as the actual designing of) modular units for interiors in offices, hospitals, showrooms, stores, and homes, equips him uniquely for such a discussion, illustrated with examples of his work. *Louise Sloane*

THE MODULE WITHIN

by G. Luss

As broadly as modular systems are applied today to the structures of buildings, so broad is the destiny of the module for the interiors of buildings.

My own firm committed itself long ago to a modular approach for office interiors. The reasons are direct and irresistible: springing from certain implacable facts about postwar conditions.

Basically, of course, they are a matter of economics and efficiency, and the integration of the two in the service of postwar business needs. Ever since the beginning of the postwar construction boom, large corporate firms have sought to utilize the advantages inherent in the new type of modern, air-conditioned office building—the opportunity to set up with technological advances, automated procedures, new operational methods, new equipment, more efficient layouts, new concepts of furnishings and decoration for the human aspects affecting productivity, etc.

No mere whim—this new concept of physical facilities and operational methods is of basic urgency to accommodate the vast expansion, the increased complexities accumulated by business and industry during the war.

At the same time, the achievement of these advantages involves some hard-headed engineering, technical, and cost factors. There are the relatively higher rentals in new structures. There are the similar jumps in construction costs. There are the interrelationships among interior technical elements which demand expert prior planning, to avoid errors which may later require costly reconstruction. There is the new postwar practice of signing long-term—10-, 15-, and 20-year—leases, in order to avoid the costliness attached to moving as well as the costliness of interrupting work. In rental alone, the corporation leasing space in a new building is almost always committing itself to expenditures of several million dollars.

Logically therefore, while the business executive is eager to avail himself of modernization, new space, streamlined facilities, he is equally concerned that the expenditures involved pay off as a sound investment, not only for his current requirements but also over the long-range period of his lease. And he looks to the

The building module itself keys the design of reception room entrance.
Photos: Ben Schnall

the module within

office-interior specialist for this assurance.

All of which brings the basic objectives into clearly defined focus for the interior planner and designer. It imposes upon him a responsibility which, multiplied by the many corporate giants who make up the major tenancy in the new buildings, actually represents the executive and administrative operations of the country's economy. And it therefore demands of the serious, realistic office designer a basic three-fold approach to his work:

1. To offset high rentals by maximum utilization of space.

2. To establish interiors that provide maximum efficiency for current requirements and are adaptable to future expansion requirements at minimum cost and without major reconstruction.

3. To accomplish these efficiency and economy feats within form and design that are esthetically sound, that provide the human needs of comfort and attractive surroundings.

Of course, to project the idea of a given space equipped to be suitable for virtually a lifetime of business and human needs is to suggest an interior of extraordinary "amiability." But this can and is being done. And in the experience of my own firm, the formula is pinpointed in the *definitive* interpretation and use of the module to achieve a total modular interior. Let me note here that the "definitive" is emphasized because while "module" may be a given length, "modular" must incorporate interchangeability and flexibility: and the former doesn't guarantee the latter. Movable partitions, for example, may be established over a floor on a 3-ft module but if the ceiling lighting is on a 4-ft module, the whole value of the movable partitions may be lost. As a matter of fact, there are many elements and materials produced by various manufacturers—flooring, cabinets, desks, etc.—which are each advertised and sold as "modular" but which are not interchangeable at all. Because, again, while some selected flooring tile may be all executed by the particular manufacturer on one module, if it is combined with some ceiling, wall, etc., material manufactured by another producer on another module—together they will offer no modular performance.

partition: module 2'-8"/ movable/ steel and glass/ E. J. Boyle Division of Aetna Steel Products Corp., 14 Charlton St., New York 14, N. Y.

ceiling: module 2'-8"/ luminous ceiling/ DeCew & DeCew, 550 Fifth Ave., New York, N. Y.

furniture: designed by G. Luss/ Lehigh Furniture Corp., 16 E. 53 St., New York 22, N. Y.

flooring: V'Soske/ Lord & Adams, 4 E. 53 St., New York 22, N. Y.

partition: module 3'-0"/ brass and glass/ designed by G. Luss/ Gerber & Co., Inc., 99 Hudson St., New York, N. Y.

ceiling: module 3'-0"/ luminous ceiling/ perforated plastic diffuser/ designed by G. Luss/ Lightolier, Inc., 346 Claremont Ave., Jersey City, N. J.

furniture: module 3' and 6'/ walnut, lacquered plywood, "Formica," and brass/ designed by G. Luss/ Ezra Blank Assoc., 117 Lombardy St., Brooklyn, N. Y.

flooring: module 1'x1'/ vinyl tile/ Robbins Floor Products, Inc., Tuscumbia, Ala.

files: module 1'-6"/ Steelcase Co., Grand Rapids, Mich.

corridor ceiling: module 1'x1'/ "Acoustone"/ United States Gypsum Co., 488 Madison Ave., New York, N. Y.

corridor lighting: module 1'x1'/ recessed incandescent/ Lightolier, Inc.

partitions: module 3'-0"/ walnut, stainless steel, milk glass/ designed by G. Luss/ Ezra Blank Assoc.

closets: module 3'-0"/ walnut and stainless steel/ designed by G. Luss/ Ezra Blank Assoc.

ceiling: acoustical plaster/ United States Gypsum Co.

flooring: "Domain"/ The Magee Carpet Co., 295 Fifth Ave., New York 16, N. Y.

lighting: module 3'-0"/ recessed fluorescent dome/ Lightolier, Inc.

the module within

The modular approach to the module then, as proposed in the context here and as applied by my own firm, is the use of a given length on which to construct all the basic interior elements—movable partitions, lighting fixtures, ceiling tiles, hard flooring materials, as well as furniture.

What happens under this kind of modular system is that a space can be obtained which is engineered and controlled, permitting a total interior suited to the specific current requirements of a project. Simultaneously, it permits a flexibility within which there is unlimited possibility for rearrangements, shifting about, interchangeability without affecting major installations. And it enables all these elements to be reused and adapted, efficiently and economically, to changing business needs over long-term leases.

However, given an interior designer armed with this definitive understanding of the modular concept in action—he still doesn't start from scratch. He is always the beneficiary of a pre-established building module and must therefore incorporate his work and thinking within a set framework. This framework becomes a criterion of the efficiency which the designer is able to integrate into his planning of the interior space. And it becomes also, to some extent, the criterion of the designer's economic utilization of materials.

For example, a sampling of completed postwar buildings constructed in New York City indicates modules of 4′-0″, 4′-2″, 4′-3″, 4′-4½″, 4′-6″, 4′-7″, 4′-8″, 4′-9″, 4′-10″ and 5′-0″. Looking at this standardization, alongside the standardization of products and materials achieved by the majority of manufacturers in the postwar period, we find the following: fluorescent lighting fixtures—1″x2″, 1″x4″, 2″x2″, and 2″x4″; acoustical ceiling tiles—1″x1″, 1″x2″; metal partitions basically available from stock on a 6″ increment; flooring materials—6″x6″, 9″x9″, 12″x12″.

These are just a few of the major materials which are utilized in constructing an interior. What appears quickly and clearly in these figures and is illustrated *(Chart 1)*, is that all of these

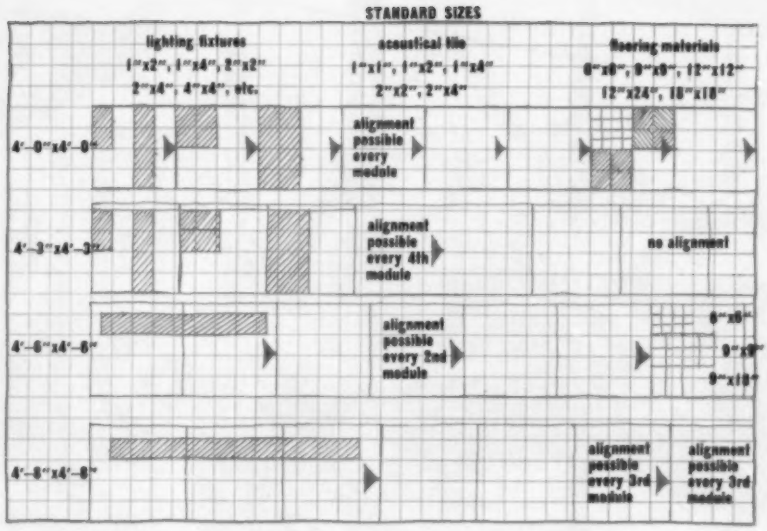


Chart 1 (above).

Chart 2 (below).

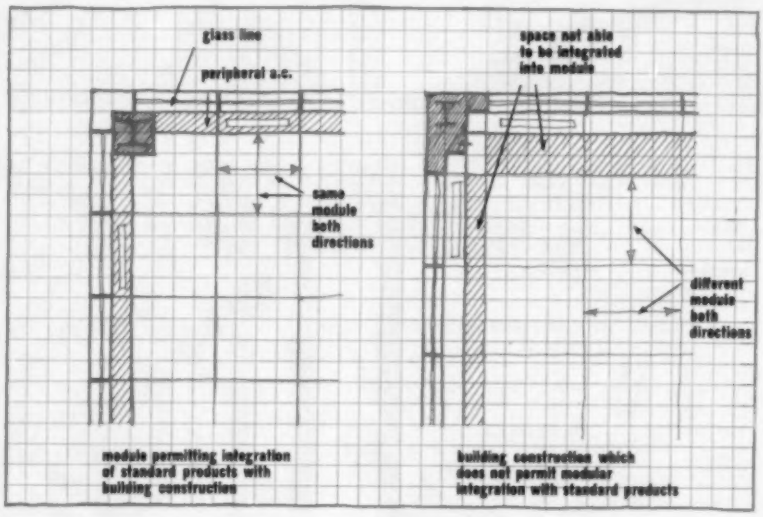
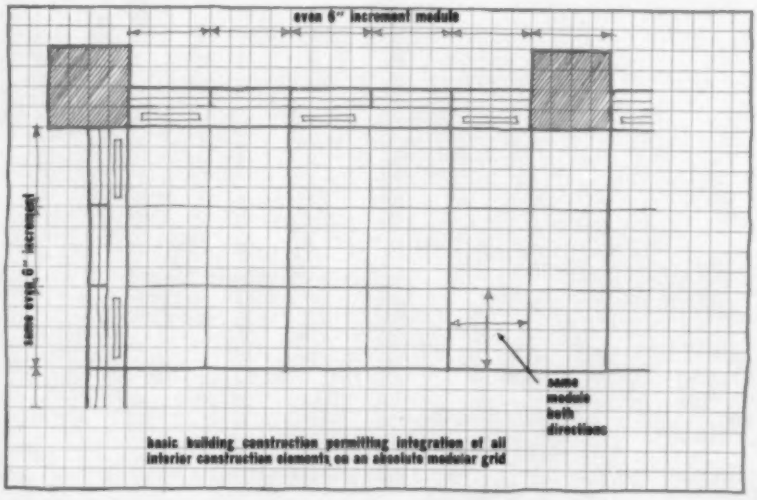

glass line
peripheral a.c.
same module both directions
space not able to be integrated into module
different module both directions
module permitting integration of standard products with building construction
building construction which does not permit modular integration with standard products

Chart 3 (below).


even 6″ increment module
same even 6″ increment
same module both directions
basic building construction permitting integration of all interior construction elements on an absolute modular grid

partitions: module 2'-6"/ cherry, milk glass, clear glass, oxidized steel/ designed by G. Luss/ Ezra Blank Assoc.

ceiling: module 2'-6"/ luminous ceiling/ perforated plastic/ acoustical tile above/ designed by G. Luss/ Lightolier, Inc.

flooring: custom size 10"x10"/ cork/ Kentile, Inc., 58 Second Ave., Brooklyn 15, N. Y.

files: module 1'-3"/ The Globe-Wernicke Co., Cincinnati, Ohio.

overfile storage: module 2'-6"/ cherry with "Masonite" sliding doors/ designed by G. Luss/ Ezra Blank Assoc.

furniture: module 2'-6" and 5'-0"/ stock desks/ custom "Formica" tops/ The Globe-Wernicke Co.

the module within

materials are basically on a 1′ module or even increment thereof. Accordingly, as also illustrated *(Chart 1)*, only the 4′-0″, 4′-6″, and 5′-0″ modules permit both an engineered and integrated relationship between the interior and these basic, stock elements.

This does not intend to state that a modular integration is impossible to achieve on the other modules. But it definitely intends to state that it is impossible without the introduction of specially sized ceiling tiles, lighting fixtures, etc.—or without filler pieces to take up the additional inches beyond the even dimension.

In *Chart 2* are indicated some of the typical problems faced by the designer who desires to engineer a layout on a modular basis within the framework of the average new office building. It illustrates two examples of existing structures selected at random and showing, in each case, a corner condition which normally states the problem in its worst light. The graphic illustrations with the charts of comparative solutions indicate clearly enough the gymnastics required to effect a clean solution in the interior of the off-inch building. What happens in most cases, is that the designer must resort to a masking of the interior periphery of the building to camouflage the conditions evolved as a result of being unable to utilize the building module.

Unfortunately for the purposes here, the gymnastics are not visible in the photographs included on these pages, showing completed spaces in these areas. They are in evidence only on the plan—and in the bills which landlord or tenant eventually pay.

In general terms, the most ideal type of structure which the designer can inherit from the architect would be as illustrated *(Chart 3)*. In this framework, the designer is able to establish a single dimensional reference or module. Ideally it is on an even 6″ increment[1]—4′-0″, 4′-6″, 5′-0″, 5′-6′, etc., thereby permitting the use of standard stock materials.

Ideally, also, it permits the utilization

[1] *In his article, "Module Measure" (page 164), William Demarest states, ". . . an industrywide study group under American Standards Association . . . established four inches as the basic module for construction. . . . "Buildings are laid out in 4-in. multiples and material units are sized to fit together in repeating joint-to-joint dimensions likewise divisible by 4 in."*

partition: module 3′-0″/ movable/ walnut and stainless steel/ designed by G. Luss/ Ezra Blank Assoc.

ceiling: module 3′-0″/ perforated-plastic diffuser on T support/ luminous ceiling/ designed by G. Luss/ Lightolier, Inc.

furniture: 3′-module cabinets; 6′-module desk/ walnut, "Formica," stainless steel/ designed by G. Luss/ Ezra Blank Assoc.

flooring: 6″x12″/ cork/ Kentile, Inc.

seating: Herman Miller Furniture Co., Zeeland, Mich.

partitions: module 2'-8"/ movable/ steel with glass, and custom cork inserts/ designed by G. Luss/ E. J. Boyle Division of Aetna Steel Products Corp.

storage unit: module 1'-4"/ stock steel units/ The Globe-Wernicke Co.; custom "Formica" top and bench base designed by G. Luss/ Ezra Blank Assoc.

desk: module 5'-4"/ walnut, "Formica," and stainless steel/ designed by G. Luss/ Ezra Blank Assoc.

of one width of movable partition which is then interchangeable throughout the space. And ideally, office walls can be moved to any line on the modular grid without affecting flooring pattern, ceiling pattern, or lighting pattern.

All this, of course, assumes the designer's inherent interest in evolving such a flexible plan for his client. In the case of the "inflexible" client, the designer is at no disadvantage: he is simply charged with the task of emerging with a better solution, esthetically, because of the inherent nature of the modularly designed shell.

It is important to emphasize, however, that in essence there is no single *absolute* that cures all ills. There are certain modules which are economically more desirable because of their relationship to stock products; but certainly a very definitive building module is preferable to no module at all, whether the module readily absorbs stock and standard products. Even in cases where special equipment and materials must be designed in order to carry out a modular planning system, the economics inherent in the future flexibility and interchangeability of the parts more than offset the initial costs.

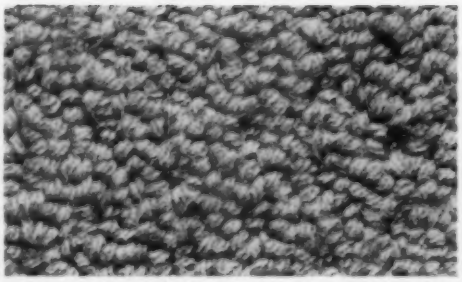
What enhances the economic and efficiency validity of the modular system is its equal esthetic validity. For, although a basically rigid system is recommended here, this does not impose rigidity on the architect or interior designer. Within the modular framework there is great latitude for self-expression and creative eloquence. The modular concept in no way limits choice of materials, choice of color, choice of lighting effects, choice of textures, choice of accessories—nor the manner in which these are combined, interplayed, designed, interpreted. Nor does it limit individual concept of line against line or the individual designer's approach to balance and proportion.

Better perhaps than words are the photographs here—all illustrating spaces designed on a universal modular application. It will be noted in the caption data that several are on the same module yet with different appearance and, in terms of the actual tenant, different performance. Color schemes, that vital element in determining esthetics, are unfortunately not visible in black and whites. But it may be pointed out that in each case they vary. The photographs also illustrate the variety of treatment of stock parts. For example, there are stock, steel cabinets, painted to order, fitted with custom-designed tops of various materials, set on custom-designed benches—achieving a total effect that is very different from the original standard appearance. Taken together, the photographs illustrate some of the variation in form, design, contour, feeling, etc., all possible within the modular system.

As used today architecturally, the module is a new phenomenon. It arises out of the times and therefore takes its place as a discipline peculiar to the present but no more confining than the disciplines of the past. On the contrary, the discipline of the module is so demanding of the designer that it becomes —like the discipline of the sonnet—an insistent process of creative refinement.

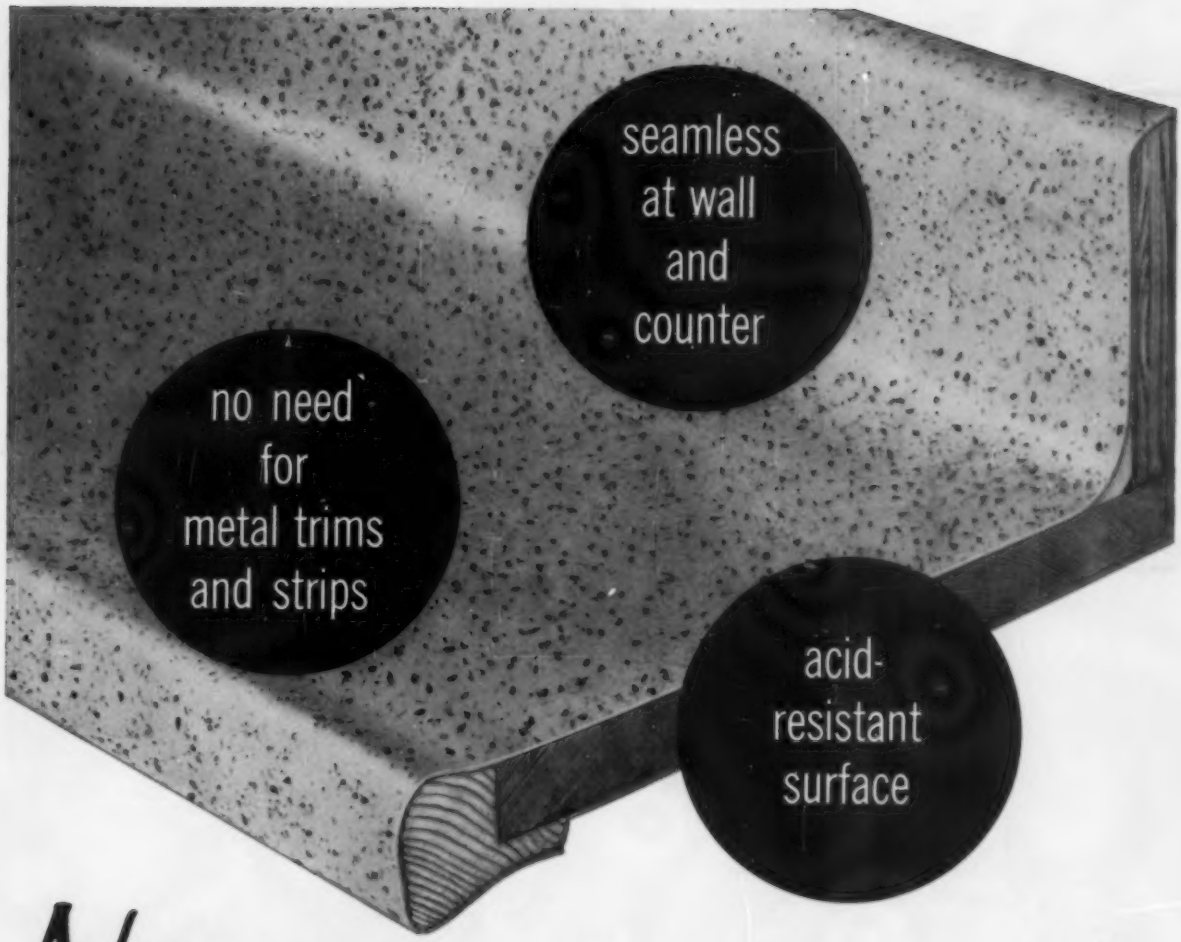
"Lytespan": lighting device with electrified raceway permitting lighting elements to be plugged in at any point/ accommodates three different types of lighting units (bullet lights as in close-up, opal glass chimneys, torchiere reflectors) as well as two accessories (walnut tray, white ceramic planters)/ adjusts for use with ceilings from 7'6" to 9'6"/ easily installed, easily moved, plugs into any baseboard outlet/ shaft available in black, white, brown enamel, or anodized brass finish/ **retail:** $49.95 as shown/ designed by Gerald Thurston/ **Lightolier, Inc., Jersey City, N. J.**

Sofa-Daybed: hand-finished wood frame in dark, smoked oak, or walnut-finished beech/ 4" reversible foam-rubber mattress/ fully upholstered back eliminates loose cushions to be removed at night/ back and seat pitched for seating comfort/ seat pulls forward to permit use of full mattress depth for sleeping/ Swedish import/ designed by Karl Erik-Ekselius/ **retail:** $330 in muslin/ **Dux, Inc., 390 Ninth St., San Francisco 3, Calif.**



Carpet: "Flaxtone"/ all-wool Wilton/ undyed Pakistan wool/ uniform natural beige color/ all-looped pile texture with random pulled-down loops/ sturdy construction, neutral color, suggest use in public areas/ available in 27-in., 12-ft, 15-ft widths/ **Archibald Holmes & Son, Erie Ave. & K St., Philadelphia 24, Pa.**

Storage Modules: "Wonderwall"/ fifteen basic units include nine with two-side utility; open-shelf, closed-shelf, pegboard-backed wardrobe and drawer units; extra shelves, drop-leaves/ of quality hardwood in butternut finish/ modules require no cutting, fitting, are designed for absolute alignment/ **I-XL Furniture Co., 67 W. Division St., Chicago 10, Ill.**



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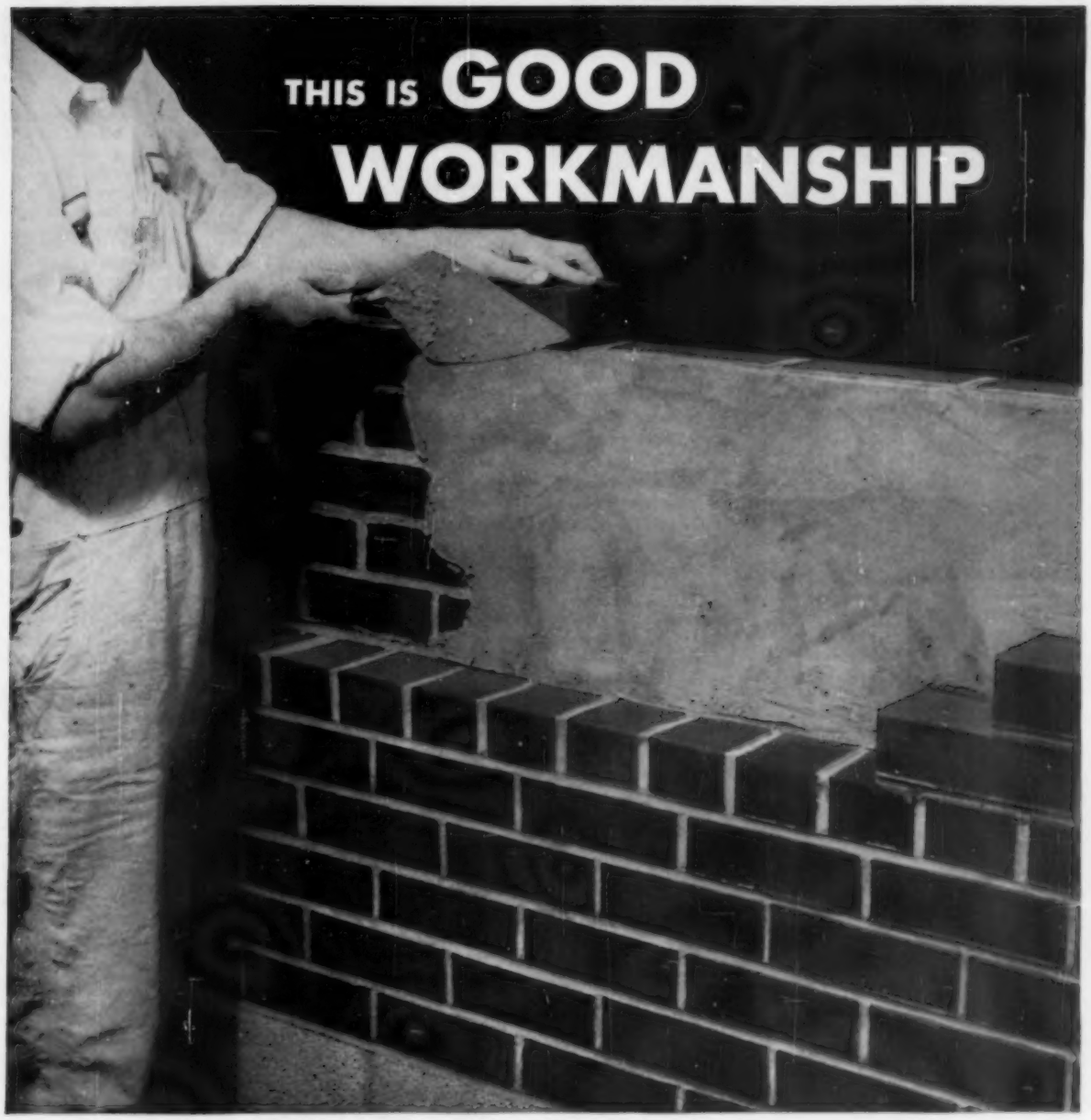

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p/a manufacturers' literature

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Catalog contains photos of equipment in specific installations for various types of college laboratories—physics, chemistry, electrical engineering, etc.—and gives information on requirements, specifications, accessories. Write: The Standard Electric Time Company, Springfield, Mass. E.C.D.

★ *Editor's Note: Items starred are particularly noteworthy, due to immediate and widespread interest in their contents, to the conciseness and clarity with which information is presented, to announcement of a new, important product, or to some other factor which makes them especially valuable.*

air and temperature control

★ **134. Residential Zone Control,** AIA 30-E, 28-p. manual describing advantages of zone control in hot water and steam-heated residences. Zone control is advantageous for spread-out floor plan, two-levels, various types of wall construction, large window areas, or different methods of heat distribution. Control lends itself to varying outdoor and indoor conditions, home modernization—offers freedom of design and added comfort, suited to individual situations. Various zone arrangements given, as well as three basic systems—control of zone valves, zone circulators, two-pipe steam—and thermostatic controls. Electronic moduflow system of control featured. Discussion of operations, features, guide specifications included. Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave. So., Minneapolis 8, Minn.

135. Year Round Comfort, Gas-Fired Lo-Hi-Boy Furnace, 4-p.

136. Year Round Comfort, Oil-Fired Lo-Hi-Boy Furnace, 4-p.

Two brochures describe furnaces for home installation. Gas-fired furnace features "quiet fire" burner—single port burner said to operate quietly, efficiently, economically, because of precision air-gas mixing. Oil-fired equipment stresses Ceramiflex combustion chamber which also acts as insulator. Appurtenances for both include all-welded cabinet, acoustifoil cabinet liner, built-in filters, double-width blower, return-air drop. Specifications given. Armstrong Furnace Co., 851 W. Third Ave., Columbus, Ohio.

137. Copper Tube Panel Grids, 28-p. guide to installation and design of residential radiant heating system using preformed, copper tube panel grids. Discusses principles of radiant panel heating; explains advantages of new system with flexible center spacing that simplifies adaptation to any plan arrangement. Diagrams suggest variety of grid designs for floor and ceiling as well as methods of indicating grid layout in drawings. Gives installation procedure with photo illustrations. Charts, drawings. The American Brass Co., Waterbury 20, Conn.

construction

249. To Those Who Desire to Invest in a Plant, 4-p. bulletin discussing system for buildings requiring underfloor wiring. System consists of concrete floor slabs with integral headers and cells. One in. cement fill on top of slabs levels floor, though not necessary to cover head ducts. Slabs, extruded by machine, are 8″ wide, nominally 4″, 6″, and 8″ thick; will withstand 50 psf superimposed load. Four in. slab has two headers; others, four. Drawings show perspective for cells, sections at floor outlet and vertical junction. System applicable to commercial, industrial, residential buildings. Lapidus Slab Corp., 9031 Fort Hamilton Pkwy., Brooklyn 9, N. Y.

250. Steelcraft Standard Steel Buildings, 24-p. catalog lists advantages of standard construction: permanence, economy, durability, flexibility. Structural types include rigid frame, truss type, panel type, special type, with explanation of each, plus dimensional data and design load tables. Construction details illustrate blanket type insulation, rigid insulation board, masonry walls, fastening roof, eave line, "Y" column detail, ridge, assembly, overhead crane runway. Canopy data furnished; accessories shown. Photos of typical installations, engineering specifications included. Standard fabrication gives quick assembly. The Steelcraft Manufacturing Co., 9017 Blue Ash Rd. Rossmoyne (Cincinnati), Ohio.

★ **251. Tensioning Materials for Prestressed Concrete,** 8-p. booklet provides information on various types of tensioning materials used in prestressing concrete. Method of tensioning for uncoated stress-relieved strand for pretensioned bonded design described; element is 7-wire strand—properties for strand included. Similar information set forth for post-tensioned design, using galvanized strand. Details for post-tensioned strands for end fittings, bearing plates, typical jacking equipment. Method of prestressing slabs on grade illustrated. Uncoated stress-relieved wire uses and properties shown by tables and photos. Construction Materials Div., John A. Roebling's Sons Corp., Trenton 2, N. J.

252. Mult-A-Frame for Industrial Applications, 28-p. booklet contains data on basic industrial channels—adjustable and reusable—which need no drilling or welding. Channel is of serrated baked enamel. Featured is one-piece spring-T-bolt which locks to prevent slipping—can be inserted anywhere along channel lengths. Channel formed of heavy-gage, cold-rolled steel—can be cut any length with tolerances held to ⅛″. Safe-lock fittings are same width as channel. Channel available in welded multiples to meet any required column-and-beam strength specification—bolting arrangement in any direction. Keyed fittings detailed and illustrated. Tubular bracing, portable racks also available. Property tables show elements of series. Illustrations of applications. Ainsworth Manufacturing Corp., 1471 E. Atwater, Detroit 7, Mich.

Design Manual, Welded Wire Fabric for Building Construction, AIA 4-E-2, 46-p. has been revised to correspond with latest edition of American Concrete Institute's "Building Code Requirements for Reinforced Concrete." Data includes uses of steel fabric in concrete for short-span construction under concrete floors and roofs, tilt-up wall construction in particular. Copies may be obtained direct: Dept. 50, Wire Reinforcement Institute, 1049 National Press Bldg., Washington 4, D. C.

★ **253. Panelbild,** AIA 17A, 8-p. booklet illustrating plywood stressed skin panels for floor, roof or wall. Panelbild system components are laminated under pressure and controlled conditions, providing strength, minimum bulk. Components may be specified for part or whole of structure. Details, drawings, data given for roof and floor panels, including available sizes. Wall panel described by section drawings, specifications. Details of panel construction and installation included. General specifications, building code acceptance, materials (plywood and casein glue), fire resistance listed. Panelbild Systems, Inc., 7010 196th S. W., Lynnwood, Wash.

254. The New Measure for All Masonry, 56-p. booklet illustrating use of modular planning and dimensioning—using 4-in. unit of measurement—in facing tile. Two types of tile—Brictile (3 course in 16", 6 units in 48") and Tribric (3 course in 16", 4 units in 48")—are produced in modular sizes. Applications include loadbearing or veneering walls for industrial, commercial, and public buildings. Permanently glazed, tiles are available in several colors—mottled and solid designs. Clear glaze suggested for some applications. Features of glaze include imperviousness, opacity, chemical resistance. Specifications, cost estimates detailed. Drawings of two series, photos of installations, horizontal and vertical coursing tables provide data. Numerous drawings of modular planning and detailing of specific jobs, showing use of 4-in. grid featured. Stark Ceramics, Inc., Canton 1, Ohio.

255. Architectural Grade Weldwood, AIA 19-F, 32-p. handbook covers all major aspects of interior design with plywood panels. Provides general data on grades, types, veneers. Features construction details for paneling typical room: layout, elevations, furring, joints, corners, curved panels. Also gives details for counter-fronts, furniture, custom stile-and-rail panel design. Photos, specifications, charts, sizes, United States Plywood Corp., 55 W. 44 St., New York 36, N. Y.

doors and windows

319. Miller "250" Series Aluminum Sliding Glass Doors for Single Glazing, AIA 16-E, 4-p. brochure includes doors for frame-stucco, concrete-block, brick-veneer construction—doors to accommodate ¼" plate or crystal glass. Alumilited finish (applied from outside) offers protection; vents sealed with double-seal woven wool pile, silicone treated. Features are: flat header top for easy installation, weatherstripped slider, flat-back fixed jamb, box-section design for interlockers, vent jamb, threshold with load-bearing points under sliding and stationary panels. Standardized sizes and specifications given. Frank B. Miller Mfg. Co., Inc., 3216 Valhalla Dr., Burbank, Calif.

320. Miller "1000 Series" Aluminum Sliding Glass Doors For Interchangeable Dual or Single Glazing, AIA 16-E, 4-p. Interchangeable molds accommodate dual or single glass without disturbing framing installation. Parts include flat header top, slider weatherstripped with mohair pile, fixed jamb extended to room flush with plaster, box-section designed interlockers, vent jamb, adjustable bumpers. Alumilited finish, doors are offered in standard sizes as well as additional models for specialized applications. Specifications and detail drawings featured. Frank B. Miller Mfg. Co., Inc., 3216 Valhalla Dr., Burbank, Calif.

321. Plexiglas Dome Skylights, AIA 12-J, 20-p. booklet provides information for specification of skylights made from acrylic plastic and gives data for calculation of daylighting values for designing dome skylight systems. Basic components include formed dome, metal inner or curb frame, outer frame, neoprene gasket, rivet or screw fastener, condensation gutter, expansion-contraction allowance. Various types of domes and accessories illustrated. Brightness, features, building-code requirements, installation discussed. Lumen input method of calculating requirements detailed as well as complete calculations. Tables, details used to illustrate data. Rohm & Haas Co., Washington Sq., Philadelphia 5, Pa.

322. Prefabricated Toplite Roof Panels, AIA 12-J, 18-p. file folder containing construction details, specifications, illumination data for two new types of panels: one requiring a curb, one set flat on roof. Axis running 45° to north-south offers flexibility of design and orientation. Standard sizes presented, specifications for flange-type and curb-type panels included. Graphs show relative brightness and degree of light transmission of panels. Kimble Glass Company, subsidiary of Owens-Illinois Company, Ohio Bank Bldg., Toledo 1, Ohio.

electrical equipment, lighting

419. Paragrid Tile, AIA 31-F-2, 6-p. brochure features new illuminated ceiling, with suspension bi-planar construction. Molded of specially pigmented polystyrene, bi-planar tile construction enables wide spacing of lamps and increased diffusion. Detail drawings of components, sample layout, specifications included. Tile available in modular 16"x16" units. Easy installation and maintenance claimed; tile usable in any lighting installation. J. A. Wilson Lighting and Display Inc., 516-517 G. Daniel Baldwin Bldg., Erie, Pa.

420. New Light Control With Sylvania Reflector Fluorescent Lamps, 4-p. folder describing reflector fluorescent lamp line. Brochure features use of lamps in direct, indirect, directional installations. Inner white reflector coating of lamps said to increase light output 60%. Special applications discussed. Various models—sizes and colors—listed. Sylvania Electric Products Inc., 60 Boston St., Salem, Mass.

421. 3-R's and Daylighting, AIA 10-F, 12-p. pamphlet describing approach to school lighting which stresses quality rather than quantity of light. To achieve this end, application of prismatic glass block is recommended and discussed. Illustrations show how blocks alter course of light rays. Installations of various block-and-window combinations are shown in photos. Pittsburgh Corning Corp., One Gateway Center, Pittsburgh 22, Pa.

422. Fluorescent Engineered Lighting Surface Series, AIA 31F2, 16-p. catalog presenting data—specifications, cross-sectional construction drawings, candle-power-distribution curves, and coefficients of utilization—for line of shielded fluorescent units. Models featured have no visible screws or latches; special latch responds to finger-tip pressure for opening door. One-piece construction has corners of units are welded and ground smooth to eliminate

(Continued on page 206)

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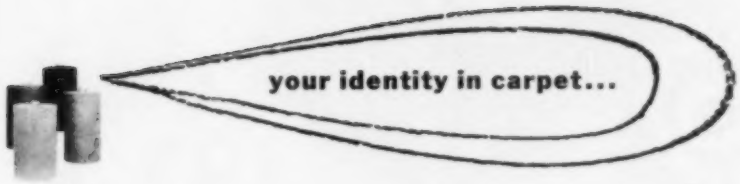

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p/a manufacturers' literature

(Continued from page 199)

seams, light leaks. Various diffusing mediums available. Gruber Brothers, Inc., 125 S. First St., Brooklyn 11, N. Y.

423. The Modu-Luminus Ceiling, AIA 31F290, 4-p. brochure outlines advantages of ceiling system. Composed of vacuum-molded luminous plastic squares supported by "V" track system, ceiling is suspended from grid light source system or other systems. "V" track system: eliminates nuts and bolts in assembly; mitred corner piece inserted in perimeter of tract gives flush finish; two rod hangers suspend track system from other system. Panel borders are formed to fit track; plastic nib locks panel in place; raising rest of panel border allows air diffusion. Multi-Lite grid system gives complete prewired installation and structural support for ceiling. Socket channels are mounted end to end—prewired raceways intersect channels at right angles. Channels mounted flush or suspended ¼" on 6-in. centers—ballasts on bottom of channel. Details of ceiling and grid system. Luminous Ceilings Inc., 2500 W. North Ave., Chicago 47, Ill.

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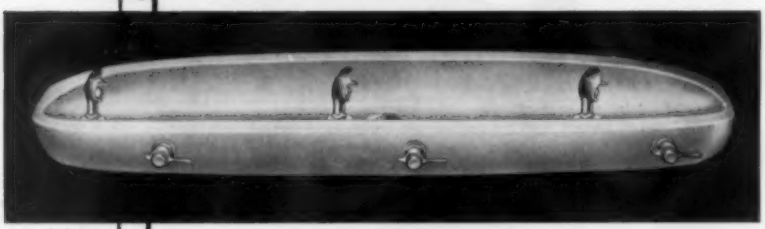

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finishers and protectors

537. Koldrock, 2-p. bulletin describes protective coating for low-temperature insulating materials. Coating is all-mineral, suited particularly for refrigerated or cold-storage rooms. Surface after application is smooth, clean, seamless, hard. Said to be fire resistant, protector will meet local sanitary and fire codes. Wide range of colors available. Installation and mixing instructions outlined. Selby-Battersby & Co., 5220 Whitby Ave., Philadelphia 43, Pa.

538. Tweed, 8-p. pamphlet illustrating multicolored textured finish for use on masonry, wood, plaster, metal, and dry wall. Paint has built-in smoothness of plastic coating — will resist marring, scratching, staining. Given a washable surface, finish can be applied in one spray coat. Color and texture offer numerous opportunities for design applications. Thirty-four colors, with examples, illustrated. Raffi and Swanson, Inc., Wilmington, Mass.

sanitation, plumbing, water supply

746. Streamline Plumbing and Heating Products, AIA 29-B-4, 52-p. catalog giving engineering data and dimensional information for copper tube, solder-type fittings and valves. Details listed for copper water tube, cast solder-type fittings, forged solder-type fittings, cast valves, cast drainage fittings, flanged fittings, and extra heavy wrot fittings; heating specialties. Soldering instructions and accessories, tools also listed. Each product illustrated by photos and detail drawings. Mueller Brass Co., 1925 Lapeer Ave., Port Huron, Mich.

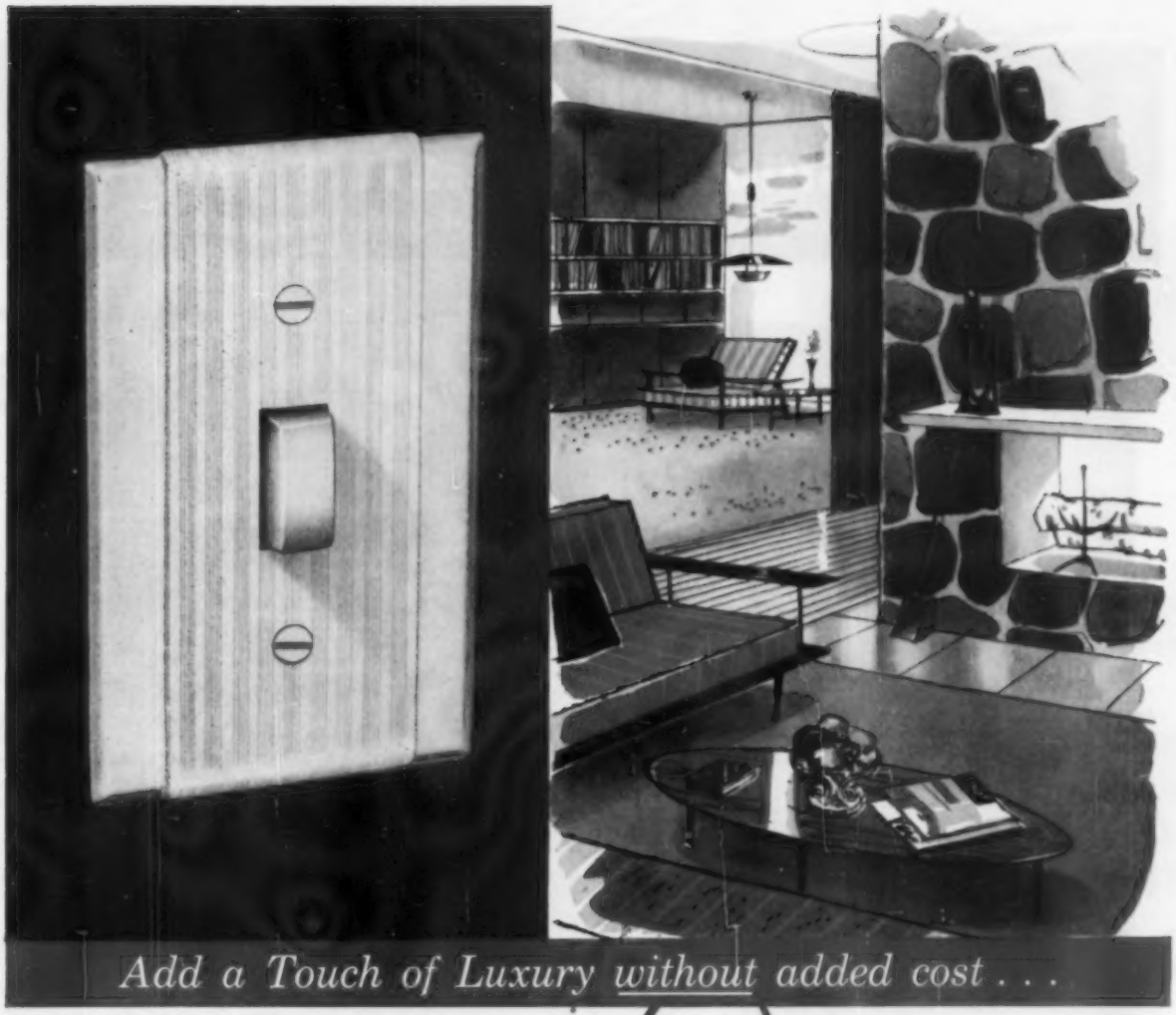
747. Filtrine Water Coolers, 24-p. catalog showing range of concealed, remote, and cabinet-type stainless-steel water coolers for factories and institutional buildings. Includes special coolers for cafeterias and restaurants. In addition, covers selection of water purifiers and drinking fountains for installation in or on the wall. Photos, drawings, selection tables, dimensions, engineering data. Filtrine Mfg. Co., 84 Prospect St., Waldwick, N. J.

specialized equipment

889. Loxit Miracle Plastic Finished Wall Panels, 4-p. full color bulletin describes high-temperature baked-plastic enamel panels for use in residential and commercial installations. Three types of paneling available: Tylalux—deluxe type, in plain, tile or triline patterns; Tylatone —resembles marble, in several patterns; Tylawood—recreates grains of woods. Various colors offered in each type. Paneling easily cleaned; said to be impervious to ordinary acids and alkalies. Several sizes offered. Loxit Systems, Inc., Miracle Products Div., 1217 W. Washington Blvd., Chicago 7, Ill.

890. "Sovereign," 1-p. data sheet introducing new electric erasing machine for draftsmen. Lightweight, machine has air-

(Continued on page 208)



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p/a manufacturers' literature

(Continued from page 204)

cooling vents for cool operation. Eraser features minimum torque pull and automatic stall control for protection against heavy pressure. Octagonal shape helps prevent machine from rolling off table. Push-button control; 8" long, 2⅜" wide at motor housing. Frederick Post Company, 3650 N. Avondale, Chicago 18, Ill.

891. Inventive Designs, 20-p. brochure containing eight design projects by outstanding architects. Designs include bathrooms, bathroom-sun patio, home entrance, modern kitchens and kitchen areas. Use of ceramic tile is featured. Complete photographs of each area, including color and detail shots. Editorial comment of each design. The Tile Council of America, Inc., 800 Second Ave., New York 17, N. Y.

892. Northpoint, 8-p. catalog reports on uses of the compass as decoration for patio, terrace, porch, hearth, other recreation places in commercial or residential structures. Many designs illustrated—all cast in solid brass, ¼" thick, satin or verdi-antique finish. May be placed in pavement or flagstone walk. Variety of medallion inserts and letters available. Manor Crafts, 41 Crescent Dr., Albany 8, N. Y.

893. Sedgwick, 8-p. booklet gives data on dumb waiters, dumb-waiter doors, sidewalk and residence elevators. Electric dumb waiters: roto-waiter for two stops, or traction-type for several stops available; specification, materials, accessory equipment included. Under-counter, freight, roto-waiters, illustrated as well as parcel lifts and sidewalk elevators. Two types of hand-power dumb waiters listed—"ABC" aluminum dumb waiter and correspondence lift. Electric residence elevators pictured. Sedgwick Machine Works, 80 Eighth Ave., New York 11, N. Y.

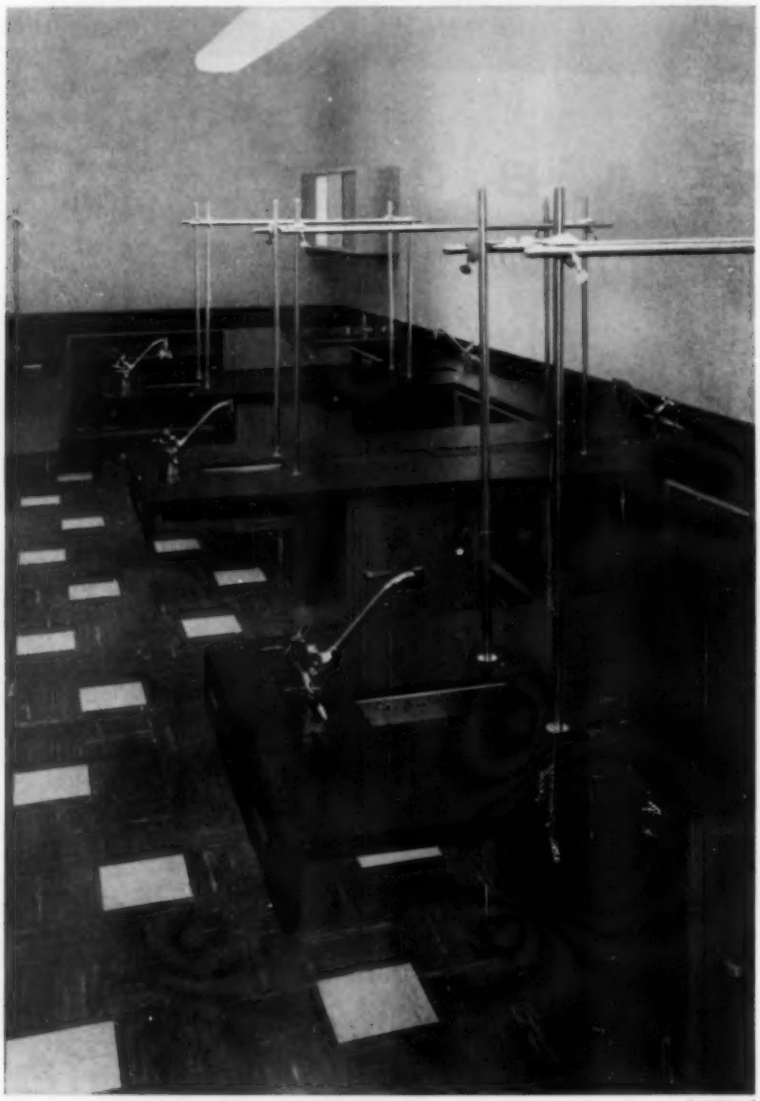
894. Bathing Beauties in Wonderful Water Colors, 16-p. catalog of bathroom fixtures and appliances in various colors. Several designs pictured, using color schemes of gray, green, yellow, tan, blue, pink hues. Floor plans also suggested. Combination of colors available in fixtures. Features of bathtubs include: wide flat bottom, wide seat rim, safety grip rim hidden water seal; permanent finish is easy to clean. Various kitchen sink models described. Alliance Ware, Inc., P. O. Box 809, Alliance, Ohio.

surfacing materials

969. 1957 Asphalt Tile Color Classification Chart, AIA 23-G, 4-p. file sheet giving latest colors and patterns for 10 tile manufacturers' lines in marbleized, terrazzo, and cork patterns. Tables also show what tiles give similar effects or tones. Asphalt Tile Institute, 101 Park Avenue, New York 17, N. Y.

970. "Floor-Planned" for the Modern School, 4-p. catalog sheet describing three types of tile applicable for schools—reinforced-vinyl tile, asphalt tile, vinylized tile. Features of reinforced-vinyl tile include closely textured surface; resistance to grease, acid, alkalis; high flexural strength; resists indentation; unaffected by moisture; nonslip surface. Comparative features of other types of tile also given, as well as photos of installations and adaptability of each type of tile to certain areas in school design. Azrock Floor Products Div., Uvalde Rock Asphalt Co., Front Bank Bldg., San Antonio, Tex.

971. New Formica Idea Kit for Architects, folder contains information concerning various uses of laminated plastics. Kit includes booklet, "Formica Commercial Interiors," showing application of plastic in commercial and industrial buildings—featured is new process which allows patterns to be silk-screened into material; swatchbook of new colors and patterns available; residential installation folder; vertical surfaces folder explaining technological advances in adhesive development; AIA 35-C-12 file informing of preparation and installation of tub-shower wall. Formica Corp., 4614 Spring Grove Ave., Cincinnati 32, Ohio.



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Above: Reception Lobby.

Above: Cafeteria and Lounge.

Right: Court, Penthouse and Lounge.

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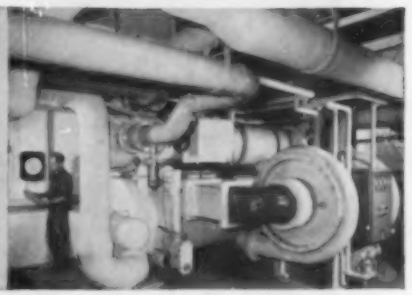
Left: One of two central panels with Powers Series 100 Temperature Indicating Sub-Master Controllers. Pneumatic selector switches provide manual operation when required.

Right: Chilled water supply for air conditioning units is regulated by a Powers Temperature Recording Controller.



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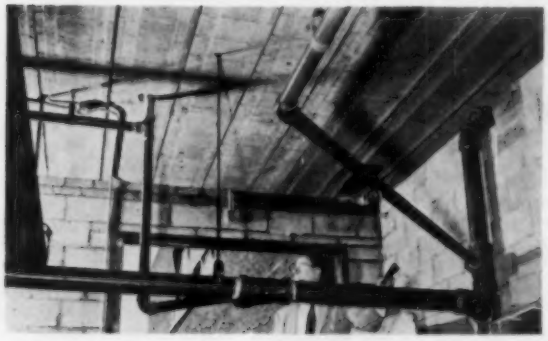
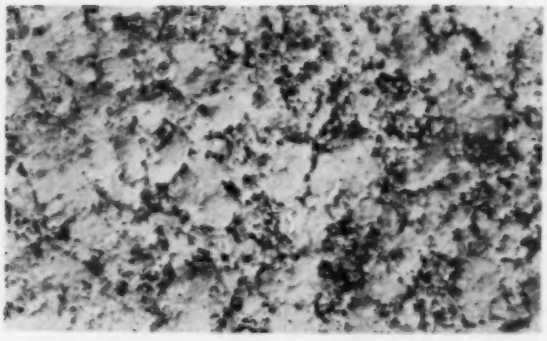
"Truss-skin" self-supporting roof system (above), *made of arched, 2'x10', 14-gage steel panels, bolted together, provides an unobstructed span of 150'. System can reduce erection time 35 percent as compared to conventional structures and is said to cost 33 percent less than similar roof structures. Wonder Building Corp. of America, 30 N. LaSalle St., Chicago, Ill.*

Rigid polyvinyl-chloride pipes in high-school laboratory (below), *running from laboratory to basement and to roof, drain chemicals and other waste materials and serve as vent stacks. Rigid Koroseal pipe withstands corrosive action of most chemicals. The B. F. Goodrich Co., Akron, Ohio.*





New steel-wall partitions (above), *installed before ceilings are hung, go through, rather than to, ceiling. Three in. thick partitions, made of 20-gage cold-rolled steel and filled with bats of rock wool, produce a decibel rating of 43.5. Workmen are laying floor channel, snapping on baseboard, and attaching linking device. E. J. Boyle Div., Aetna Steel Products Corp., Pottsville, Pa.*

New architectural material—oxy-acetylene or thermal-textured granite (left)—*is produced by making successive parallel sweeps over granite with a 6000 F, 4"-wide oxy-acetylene flame held about 1" away from surface. This action results in controlled spalling and produces a pattern of highlights, shadows, and smooth reflectant spots practically impervious to weather. Linde Co., Div. of Union Carbide Corp., 30 East 42nd St., New York 17, N. Y.*

Module of Smithcraft integrated ceiling (right) *is determined by fluorescent-lamp length. Longitudinal members of grid, 6' on centers, support lamps and contain electric wiring. Bottom grooves receive and support movable partitions. Snap-in perforated baffles with acoustical filing are spaced 2' on centers. Both normal and partition-receiving baffles can be snapped in place. Smithcraft Lighting, Chelsea 50, Mass.*

p/a products

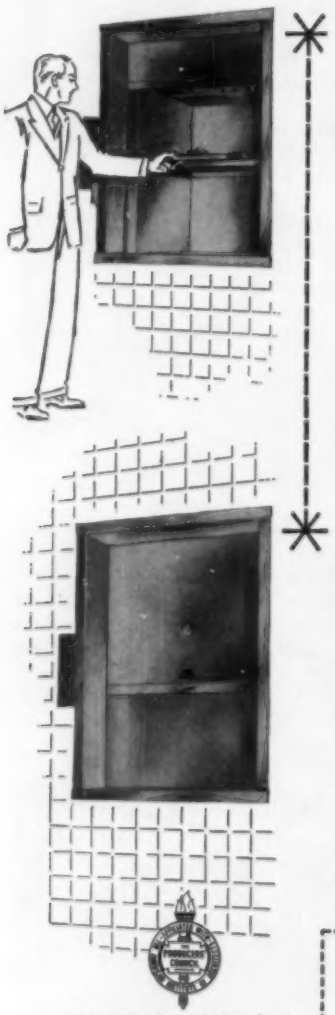
(Continued from page 213)

air and temperature control

Year Around Air Conditioning: system using no furnace, chimney or ducts, features Electric Percojet Heat Pump which circulates heating medium. Pump has no moving parts—each conditioned area has individual unit connected with system for both heating and cooling. Chilled water is circulated in summer—pump circulates hot water in winter. Unit has fractional horsepower motor with centrifugal fan, variable speed control, to give required temperature. Air is filtered, dehumidified while cooling. Maximum heating capacity, single unit: 11,400 btu per hr at 175 cfm, circulating 2 gal per min. of 180° water. Cooling capacity: 4800 btu, air movement at 175 cfm, circulating 2 gal per min. of 40° water. Adaptable to homes, commercial buildings. Electric Heating and Cooling, Inc., 890-898 Broadway, Newark 4, N. J.

Sunray IV: Cast-iron oil packet boiler developed for small- to medium-sized homes is available in four sizes—67,000 to 158,000 btu per hr. Packet includes boiler with simplified, high-pressure atomizing oil burner, round-type room thermostats, two-piece design combustion control, and stack switch relay. Advantage of combustion control is positive, immediate response. Four-piece chamber absorbs thermal shock. Fuel economy obtained by multiple flues. Unit is finished in heavy-gage steel cabinet. Compactness and light weight of unit featured. Heating and Air Conditioning Div., National-U. S. Radiator Corp., 507 Ash St., Johnstown, Pa.

Concentrate Responsibility...



Specify SEDGWICK **Dumb Waiters** and SEDGWICK **Dumb Waiter Doors**

When you select a Sedgwick Dumb Waiter, you get a *completely* integrated installation — including dumb waiter doors — designed, engineered, manufactured and installed by Sedgwick.

This places the responsibility for the entire installation in the hands of *one* supplier — cutting in half the red tape, contracts and approvals, and eliminating your coordination of door and dumb waiter design and erection. Furthermore, all equipment is shipped at the same time, saving shipping and handling costs. The same mechanics install both doors and dumb waiters.

Sedgwick Dumb Waiters and Doors are available in a complete range of modern, improved types and standard sizes that can be adapted to fit requirements exactly.

(See standard specifications and layouts in SWEETS 33a/Se)

Doors are manufactured in bi-parting, slide-up, slide-down or hinged arrangement. Also access and clean-out doors. (Underwriters' Labelled where required.) *Send today for complete literature and specifications.*

Other Sedgwick Products

★ SIDEWALK ELEVATORS
★ FREIGHT WAITERS
★ RESIDENCE ELEVATORS
★ "STAIR-TRAVELORS"

NATIONWIDE SERVICE

Sedgwick MACHINE WORKS
164 West 13th Street, New York 11, N. Y.
☐ Please send general information
☐ Please send specific recommendation
on: _____
_____
NAME _____
ADDRESS _____
CITY _____ STATE _____

construction

Foamed-Plastic Insulated Panels: A lightweight insulated panel consisting of a rigid core of foamed-plastic laminated with aluminum, wood, glass, porcelain, or other materials is being mass produced by new process. Tubing for conduit or heating and cooling purposes may be placed in core while panels are in production. Plastic core is moisture-proof, odorless—will resist fungus growth. Various materials can be used in combination with aluminum in constructing panels. Sandwiches offer many choices for exterior and interior finishes. Fabricated on continuous bonding facilities, panels will be available in widths to 48″, thickneses to 6″. Aluminum Company of America, Room 720, Alcoa Bldg., Pittsburgh 19, Pa.

Translucent Curtain Wall Panels: new lightweight structural curtain-wall panels allow design freedom for commercial, industrial, institutional buildings. Panels are prefabricated self-supporting sandwiches of glass-fiber reinforced-plastic sheets bonded to aluminum grid. Finished for exterior-interior wall or roof surfaces, panels are available in 4 modular sizes, 6 colors. Properties include nonglare illumination, thermal insulation, resistance to shattering, fading, vibration; also good acoustical properties. Rapid installation, easy maintenance featured. Grid acts as load-bearing component and gives solid metal edge banding which can be made into flush, internal joint system. Kalwall Corp., Manchester, N. H.

doors and windows

Aluminum Windows With Integral Fin Trim: type of one-piece window-plus-flange unit can be nailed or screwed into framing without using additional trim or positioning hardware. Fin, broad extended edge extruded with window sash prepunched for nail or screw placement, goes around entire perimeter. After window is attached, exterior siding can be built up against sill. Integral fin provides weathertight seal, adds rigidity; also becomes a calking stop for exterior finishing compounds. Windows can be used for wood stud construction with brick veneer, frame, concrete block and solid masonry siding, with plaster or dry wall finish. Aluminum Window Manufacturers Association, 45 North Station Plaza, Great Neck, N. Y.

(Continued on page 216)

Presenting STARKOTE

. . . a bright new tile on the building horizon

Here is a color and texture that blends with any color scheme and any architectural style.

Starkote is a warm blue-gray speckle ceramic glaze that offers permanence, easy maintenance and an easily constructed wall and finish in one unit. "A" quality Starkote is priced as a production unit which means a 10% to 15% lower product cost. Best of all—deliveries can be accurately scheduled to meet your job requirements.

For full information and specifications contact your local Stark Ceramics distributor or write for Starkote bulletin 157.

STARK CERAMICS, INC.

CANTON 1, OHIO

14305 Livernois Ave., Detroit 38, Mich. • 386 Fourth Ave., N. Y. 16, N. Y.

p/a products

(Continued from page 214)

Prismoid-Gratelite: Prismatic louver-lens is formed by intersecting prismatic elements of clear refractive material around truncated pyramidical openings. Providing 86.1% efficiency, lens is suitable for general illumination, has low brightness control. Ventilator action of louver gives free movement of air currents, decreases maintenance. Panels are inject-molded from polystyrene or acrylic plastic; 11″ x 48″ or 16″ x 18″ sizes. Edwin F. Guth Co., 2615 Washington Blvd., St. Louis 3, Mo.

electrical equipment, lighting

Technician: recently designed lighting unit for science laboratory tables provides comfortable, high-level illumination for microscopic or ordinary visual tasks. Two 800 ma. high-output rapid-start lamps, mounted on top of each other, give high intensity light confined to table top. Constructed of steel, unit has two coats of acid-resistant enamel. When mounted, unit is 16″ high; comes in 4′, 6′, 8′ lengths—can be mounted continuously or individually. The Wakefield Company, Vermilion, Ohio.

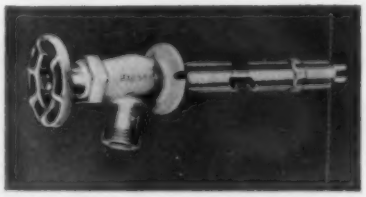
finishes and protectors

Emeri-Crete Kure: nonresinous sodium-silicate concrete curing agent hardens newly laid concrete by converting free lime to calcium silicate while preventing excessive air drying. Compound especially suitable for areas to be covered with resilient floor coverings. Contains detergent which seals porous concrete against evaporation. Solution may be applied directly from shipping container by power spray or other rapid-rate equipment. Walter Maguire Co., Inc., 60 E. 42 St., New York 17, N. Y.

Formgard: coating for concrete forms represents new approach for form coatings. Having viscosity of water, coating is compounded of various active chemical ingredients—penetrates into pores of wood and surrounds fibers, coating and drying to hard finish. Finish is said to be impervious to water, oil or chemical action of wet concrete. Recoating of form not necessary for many pourings: coating not transferred to concrete. Easily applied, coating can be used in all climates, with all concrete mixes—will dry in 3 minutes on new forms, longer on old; can be used on metal or plastic forms. Minimum use is 5-10 times. Available in concentrate form, material is mixed with 4 parts furnace oil. Industrial Synthetics Corp., 2000 W. Walnut St., Chicago, Ill.

sanitation, plumbing, water supply

Frost-Proof Wall Hydrants: new wall hydrants claim elimination of freezing during winter. Water supply is controlled by valve seat located at end of stem, within the building. Inside cut-off valves are not necessary. Constructed of copper and brass,



No. 375 (*above*) has exclusive adapter, is suitable for ½″ female sweat or ½″ IPS male thread connection. No. 376 has ¾″ IPS thread outside, ½″ IPS inside. Installation eased by notched flange at rear of sillcock body. Threaded brass valve retainers, sure-seal valve, seat washers featured. Mansfield Sanitary, Inc., Perrysville, Ohio.

specialized equipment

Sealzit Spray Gun: new dual-nozzled spray gun designed to spray plastic coatings eliminates pre-mixing and storage problems. Internal mix caps mix resin and chemicals in front of surface to be sprayed by use of dual nozzle. Efficiency may be maintained without normal hazards, it is claimed. Sealzit Company of America, 3640 Chicago Ave., Riverside, Calif.

NEW SPENCER Vacuslot

. . . the truly modern cleaning system

SEE for yourself why this easily installed, inexpensive, *completely practical* cleaning system is proving so popular. There's just nothing like it for schools, hospitals, other predominately bare floor buildings. VACUSLOT capitalizes on the ease and speed of dry mopping, yet assures the dust-free, germ-free sanitation that only *vacuum* can provide.

The SPENCER VACUSLOT System simplifies *all* cleaning tasks, including.

• Routine Maintenance • Vacuum Cleaning • Mop Cleaning
• Wet Pick-Up • Boiler Cleaning

NEW bulletin describes VACUSLOT System . . . contains "in use" photos, schematic drawings, sizing information and typical specifications. Request Bulletin 153C.

NEW 20 minute color movie shows typical Spencer Vacuum Systems in operation. Write requesting showing at your convenience.

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

TILE FOR BEAUTY

MURAL. 1 1/16" SQUARES: RED, BLACK, DARK GRAY, YELLOW, CASCADE AND WHITE. COLOR PLATE 368.

The trend today is to TILE

Here, in the Mamaroneck, N.Y., Senior High School, McCoy and Blair, Architects, created a striking effect with a mural of American Olean ceramics. It is one of many new buildings in which the decorative values of tile have been skillfully handled.

Classes will come and go, but the tile in this building will remain forever colorful, trouble-free, easiest of all to maintain.

If you have a design problem, we will be glad to cooperate with you in creating decorative effects with tile.

Write for literature. *Full color booklets. No. 600, "Tile for Schools and Hospitals". No. 901, "New Large Size Tile". American Olean Tile Co.; Executive Offices, 1249 Cannon Ave., Lansdale, Pa.*

CERAMIC TILE

American Olean

FACTORIES: LANSDALE, PA., OLEAN, N. Y.
MEMBER, TILE COUNCIL OF AMERICA, PRODUCERS' COUNCIL

LOCKER ROOM. WALLS: 51 JONQUIL. FLOOR: FAWN TEXTONE. COLOR PLATE 369.

TILE FOR UTILITY

On Murray State College's new dormitory . . .

A RUBEROID BUILT-UP ROOF

Was engineered to fit the job

Ralph Woods Hall, the new dormitory for women at Murray State College, has a unique design feature. Three dormitories are joined into one by connecting three wings with a large circular lobby.

But there is nothing unique in the use of Ruberoid Built-Up Roof specifications. The fact that Ruberoid Built-Up Roofs are the answer to many roofing problems has long been known to progressive architects and builders everywhere.

In engineering the roof construction to fit the needs of the building, three different Ruberoid specifications were used. The largest portion of the roof—398 squares—is Coal Tar Pitch and Tarred Felt with a Gravel Finish (Specification #202). A second section is a Dubl-Coverage Mineral Surface Roof (Specification #159). In still another area, Asbestos Felt and Asphalt Felt with a Smooth Finish (Ruberoid Specification #208) was used.

As with all Ruberoid Built-Up Roofs, rigid standards of manufacture will assure Murray State College of many more years of trouble-free service for their roofing dollar.

Ask your Ruberoid Approved Roofer to demonstrate the advantages of Ruberoid products when next you are faced with a built-up roofing job. You will find that there is a Ruberoid specification to fit whatever requirements you may have.

The RUBEROID Co. **Asphalt and Asbestos Building Materials**

500 Fifth Avenue, New York 36, N. Y.

- Aluminum finishing strip makes a clean joint at doors and windows. No messy calking.
- Trim corners. Specially designed interlocking metal units fit snug and tight without nails, give a custom look.
- Metal joint fastener keeps joints butted together. Acts as rain shield. Covered by succeeding course.
- Aluminum mounting strip keeps courses in perfect alignment. Vented to eliminate vapor traps. All nails hidden.

MASONITE® SHADOWVENT® SIDING offers not only these many installation features—but the enduring good looks of the panels themselves. Weather-resistant, blemish-free, Shadowvent has no knots or grain—takes handsome finishes and holds them longer.

®Masonite Corporation—manufacturer of quality panel products.

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Please send me more information about Masonite Shadowvent Siding and other Masonite exterior products.

Name.....
Firm.....
Address.....
City.....State.....
Zone.....County.....

As General Electric sees it...

LIGHTING PROGRESS

The fluorescent lighting industry has made tremendous progress in recent years. Advances in architectural styling, backed by new fixture designs and better application techniques, have brought to millions better light for modern living.

But progress almost always awakens new problems. So it is with lighting. For modern fluorescent installations, with all their style and efficiency, necessitate increasingly rigid control of ballast operating temperatures. Here's why:

New architectural designs incorporate lower ceilings, and sound-absorbing ceiling materials. Lighting fixtures are flush-mounted or recessed. There is also a growing demand for

DEMANDS BALLAST PROGRESS

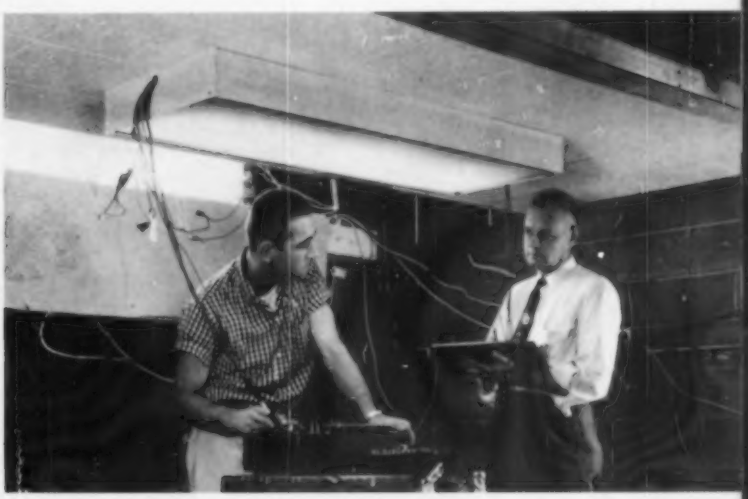
higher working foot-candles. This means more lamps per fixture and higher lamp currents. To reduce possible glare caused by higher light output, fixtures now utilize louvers or lenses, which contribute to the retention of heat. And, because space is limited, smaller cross-section ballasts are used. Thus, modern fixtures *generate more lamp and ballast heat, yet are less able to dissipate it.*

Because ballast life may be shortened if ballast temperatures are excessive, modern lighting design and application techniques place huge demands upon the ballast industry. If fluorescent lighting progress is to continue, better ballasts which will operate below standard industry heat specifications in modern applications must be developed. *Thus, lighting progress demands ballast progress.*

In working toward ballast progress, General Electric engineers have recognized that high ballast operating temperature is perhaps the largest problem to be overcome. The most important single step in solving this problem has been the development of a realistic new approach and new facilities for accurately measuring ballast operating temperatures. In a specially-constructed, temperature controlled laboratory, ballasts are actually installed in modern, totally enclosed fixtures, without the aid of heat dissipating devices (except for normal ballast base contact with the fixture channel). These fixtures are flush-mounted or recessed against typical acoustical ceilings. Thermal measurements are taken only after the ballast has reached a stable operating temperature. *Thus General Electric ballast heat measurements reflect actual, modern operating conditions.*

As a result of such research, General Electric's entire ballast line is continually undergoing major improvements designed to provide superior performance. The most recent example of G.E.'s research and development is the redesign of its 89G545 line of 40-watt, rapid-start ballasts to operate efficiently well below the industry standard of 90°C. in modern applications. Such ballast progress allows maximum latitude in fixture design and styling.

Specify General Electric ballasts! They are engineered to back up your efforts toward modern, functional lighting—*and lighting progress.* As we see it, General Electric ballast progress *is* answering the needs of lighting progress. General Electric Co., Section 401-52, Schenectady, N. Y.



New G-E testing laboratory simulates ballast operating conditions in modern fixtures, assuring realistic heat measurements.

Progress Is Our Most Important Product

GENERAL ELECTRIC

spokesmen for industry applaud MODULAR ASSEMBLY

(Continued from page 157)

In connection with modular design and construction . . . hardwood flooring, our product, will fit any specification and design.

L. M. CLADY, Secretary-Manager
Maple Flooring Manufacturers Association

MODULAR ASSEMBLY can be the catalyst in the relationship of architecture and industry. It is logical, historically speaking, that architecture expresses its own society. Ours is an industrial one. It is inevitable that, because of the complexity and economics of modern buildings, architecture must utilize the advantages of industrial standardization.

The architect, to understand and accept MODULAR ASSEMBLY, must understand and accept industry as a partner. Fear of standardization will exist only so long as it is an unknown quantity.

MODULAR ASSEMBLY would permit industry to adapt component parts of buildings to the economics of mass-production techniques. Products would have the advantages of extensive testing, controlled and predetermined function, accuracy of dimension, precision of line, and the economy of modular mass production. The manufacturer could thus approach the architectural market as a total problem rather than each project as a limited production-job shop operation.

All of the advantages of research, testing, improving, consistent performance, economy, and experience inherent in the product would permit the architect to use MODULAR ASSEMBLY with complete assurance.

We believe that aluminum is an ideal material for the MODULAR ASSEMBLY technique because of its characteristics. It is lightweight, it is strong, it is easily worked, it can be both structure and finish, by extrusion one operation can produce a form which can serve several functions. In short, it is a highly versatile metal, adaptable to multiple uses, and loses none of its beauty with age.

Imagineering will offer solutions to many of our present problems and broaden the concept of MODULAR ASSEMBLY. However, no idea is completely valid unless it is understood and accepted by those whose knowledge add the spark of creative action—the architects.

H. H. CHARLES, Director
Architectural Design & Research
Reynolds Metals Company

We are very much interested in the progress taking place for MODULAR ASSEMBLY of building products. The stone industry has used MODULAR ASSEMBLY through the ages. Stone was used in modular form for the pyramids and most of the ancient and historical buildings.

The stone industry can and will provide stone to conform to future developments of modular construction.

We are flexible and can cut stone in any dimension and prepare any surface texture to suit the creativeness of every architect and designer, at the same time to give form which most of the mass-produced materials will not be able to give.

FRANK P. TUFARO, Executive Secretary
Building Stone Institute
New York, N. Y.

I am glad you have asked for comments on MODULAR ASSEMBLY. I don't mean to infer that a great deal has not been accomplished in the last 25 years but certainly the ultimate has not been reached, and it seems to us that the rewards that would accrue from a thorough knowledge on the part of the architect, the builder, the banker, and the owner as to the results of MODULAR ASSEMBLY would be tremendous.

It is, in our opinion, impossible for the building industry to take the most advantage of the vast amount of research and development that is going on in the manufacturing industry without making MODULAR ASSEMBLY a rule rather than an exception. Mass production, automation, assembly-line methods, and the modern tools of industry with their high initial cost just don't lend themselves to tailor-made products, and tailoring in the field is not only wasteful but very expensive. I don't mean to suggest that industry in any way wishes to place unreasonable controls on the creative ability of the architect in the design of his structure, as I believe it is possible to have MODULAR ASSEMBLY as well as good design.

We congratulate P/A on devoting most of your November issue to this important problem in the building industry.

F. J. CLOSE, Manager
Market Development
Aluminum Company of America

Our products . . . have been designed from their inception with modular principles in mind. MODULAR ASSEMBLY, like modular co-ordination in building products, is a movement that should contribute greatly to lower building costs in the future.

PAUL D. JAPP, Vice-President
Pittsburgh Corning Corporation

More and more building components will be made in manufacturing plants under controlled conditions which lend themselves to improved products with definite control on quality and pricing. . . . Overall, the elimination of cutting and fitting of all the component parts of the building, due to accurate prefabrication and standardized materials, makes it possible to get a quality building faster, so, in turn, it can start producing revenue for the owners early. We feel that through MODULAR ASSEMBLY the building industry can be stimulated to produce better and more useful buildings. . . . The Acoustical Materials Association is a staunch supporter of this idea, and is working actively with the Integrated Ceilings Section so that we can be sure all of our acoustical tile materials can work dimensionally with suspension systems, air diffusers, light troffers and fixtures, fire-control apparatus, and all of the other component parts that make up an over-all ceiling in an integrated building. Modular ceiling areas with built-in services can then be tied into preplanned partition locations so that the owner is assured of the maximum flexibility of the over-all space in any building for future changes.

C. J. NOCAR, Director
Acoustical Materials Association
Assistant to President
The E. F. Hauserman Company

The gypsum industry has long favored modular dimensioning of building construction. The recommended standards, ASTM, for all of our principal products are based upon the 4-in. module. In fact, our product dimensions seldom deviate from a 16-in. module. To be completely practical we must recognize that MODULAR ASSEMBLY has not yet progressed to its ultimate efficiency. For example: a modular-sized window in a modular-dimensioned wall, finished both sides with similarly dimensioned materials, may require some cutting and fitting of the latter. As the science of MODULAR ASSEMBLY progresses we look to a diminishing need for cutting and fitting. The building industry must reduce on-site labor costs. Assembly of standardized parts in a structure of standardized design is an important cost saver.

LLOYD H. YEAGER, General Manager
Gypsum Association

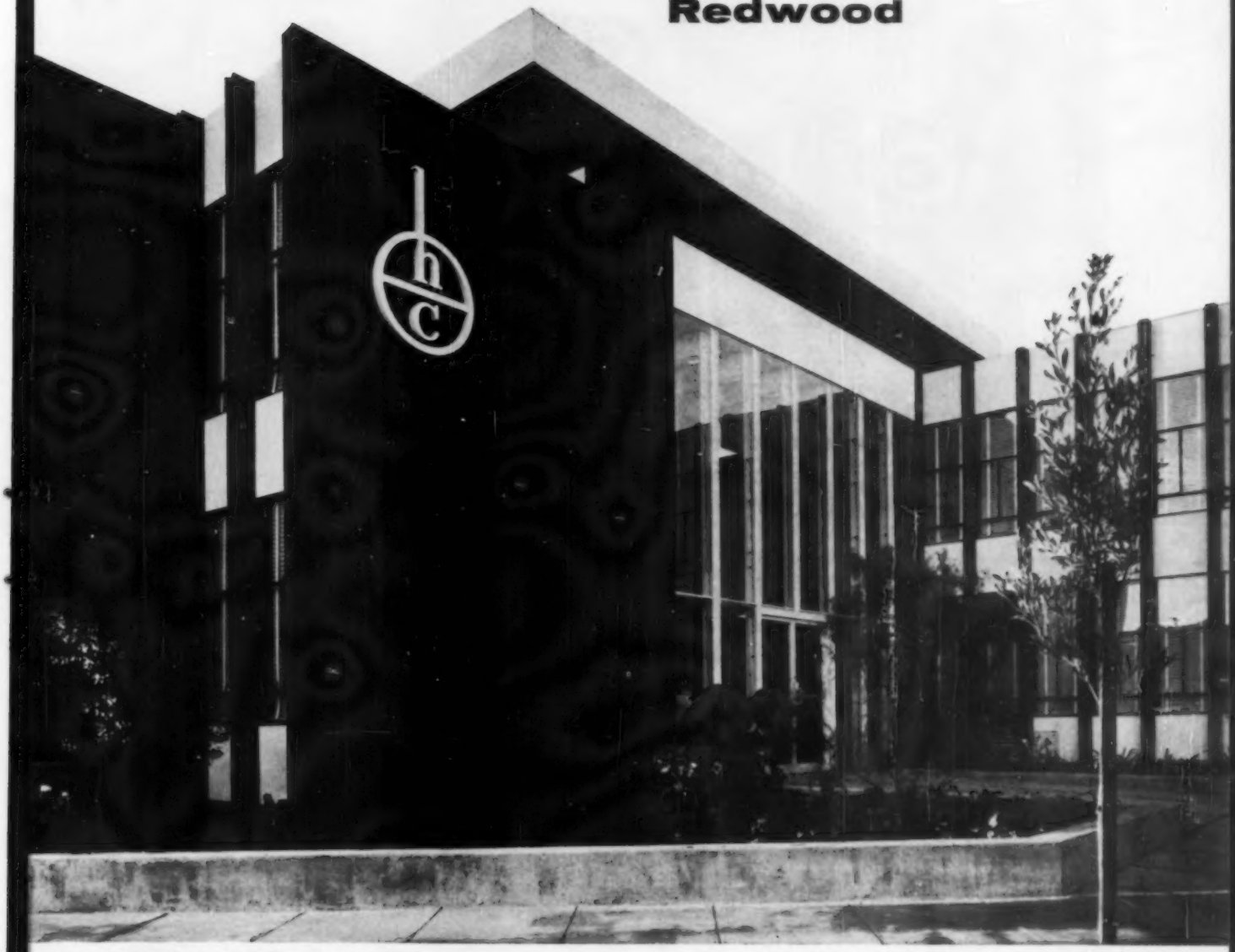
We believe that the precast-concrete industry has been one of the leaders in manufacturing products to fit standard modules. The concrete-masonry industry in particular, has converted its equipment almost completely to the production of modular sized units. Precasting and prestressing plants now produce modular size units for highway bridges and for floor and roof systems. Precast wall panels in which the form system was limited to simple edge forms are adaptable to the production of units with any dimensions and in this area standardization within one project is usually feasible and sufficient for economy. A logical future development in the precast-concrete industry will be modular-standard size framing elements, such as columns and beams for skeleton construction. Even concrete cast in place in the field may benefit from modular planning. Modular planning will permit standardization and re-use of forms, thus reducing costs of the most expensive single item in cast-in-place concrete construction.

PAUL F. RICE, Technical Director
American Concrete Institute

(Continued on page 226)

for
tomorrow's
office
buildings, too...

California
Redwood



Architects: Anshen & Allen

Photo: Roger Sturtevant

CALIFORNIA REDWOOD ASSOCIATION • 576 SACRAMENTO STREET • SAN FRANCISCO 11, CALIFORNIA

CRA

Arcata Redwood Company
Hammond-California Redwood Co.
Holmes Eureka Lumber Company
The Pacific Lumber Company
The Pacific Coast Company
Simpson Redwood Company
Union Lumber Company
Willits Redwood Products Company

PITTSBURGH GLASS is basic to the Ford Central Office Building

THE NEW ADMINISTRATIVE OFFICES of Ford Motor Company are housed in this 12-story glass and steel building in Dearborn, Michigan. The creation of Skidmore, Owings & Merrill, Architects & Engineers of New York City, this structure utilizes *Pittsburgh's* SOLEX® Green-Tint, Heat-Absorbing, Glare-Reducing Glass in the large glass areas which form a prominent part of the curtain wall exterior. In addition, this modern eye-catching building includes such Pittsburgh Glass products as TWINDOW® . . . the twin-glass insulating windowpane . . . Polished Plate Glass, Rough Plate Glass, and Pittsburgh Copper-Backed Mirrors.

Design it better with **PITTSBURGH GLASS**

distinctive architecture of the new

in Dearborn, Michigan

THE EXCEPTIONAL insulating properties of *Pittsburgh's* TWINDOW provide a clear view of this court off the main concourse of Ford's new Central Office Building, both winter and summer.

A FEATURE of this new Ford building is the use of Pittsburgh Polished Plate Glass to separate the secretarial areas from the hallway, with Pittsburgh Rough Plate Glass dividing private offices.

Your Sweet's Architectural File contains detailed information on all Pittsburgh Plate Glass Company products . . . Sections 7a, 13c, 16d, 21.

PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS · FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

spokesmen

(Continued from page 222)

When normal process of fabrication by members of the Steel Window Institute was re-established after the war years, with one single exception, all types and sizes of steel windows were redesigned in keeping with modular co-ordination. This was a drastic change from the former practice where unit dimensions had been developed from a system predicated upon glass size. In the new system, bar centers of integrally built windows were designed to conform to the modular method. These designs were primarily concerned with masonry construction, and the Steel Window Institute's efforts were closely co-ordinated with the Structural Clay Products Institute. Further developments in other metal products such as doors, door frames, and even standardized buildings, have all been developed along the lines of modular co-ordination.

G. R. RODEN, JR., Manager of Sales
Engineering Window Products
Truscon Steel Division
Republic Steel Corporation

THE BUILDING STONE
THAT MADE
THE FACE OF AMERICA

INDIANA LIMESTONE lends its beauty and permanence to buildings throughout America.

Every architectural style has its outstanding examples of the use of Indiana Limestone. The Pentagon, Empire State Building and Prudential's Mid-America Building serve to illustrate the ever-new versatility of this material so highly valued for its distinctive appearance and almost complete freedom from maintenance.

INDIANA LIMESTONE INSTITUTE
BEDFORD, INDIANA Dept. PA-87

Founded 1932 as a service organization for the architect and contractor

The Portland Cement Association has promoted the use of the grid system wherever possible as a tool for design of concrete masonry and reinforced-concrete structures....Savings inherent in standardization are self-evident. If a producer stocks a set of forms, from which he can produce units for many different consumers, the cost to each consumer will be reduced. This applies to both bridges and buildings and work along these lines is under-way in both fields.

Due to the activities of one particular form manufacturer, the double-Tee prestressed-concrete floor and roof unit is already standardized in a limited sense. . . . In addition to the double-Tee unit a number of other precast units are being produced with varying degrees of standardization. These include hollow core floor members, hollow core bridge units, precast concrete floor joists, several types of lightweight-concrete roof members, precast concrete pipe for both sewerage and drainage purposes and precast concrete lighting standards.

Standardization effects savings in cast-in-place concrete work as well as for precast products. If it were possible to set story heights at some modular height and horizontal dimensions to a similar module consistent with standard lumber form lengths, formwork costs could be reduced greatly by multiple re-use of forms. Also, if columns and beams were dimensioned to fit dressed lumber widths, much waste of both time and material could be avoided. There are a number of examples where substantial savings have been made in the construction cost of multiple barrel shells and hyperbolic paraboloids due to re-use of forms. This was made possible by development of an appropriate construction sequence during the design.

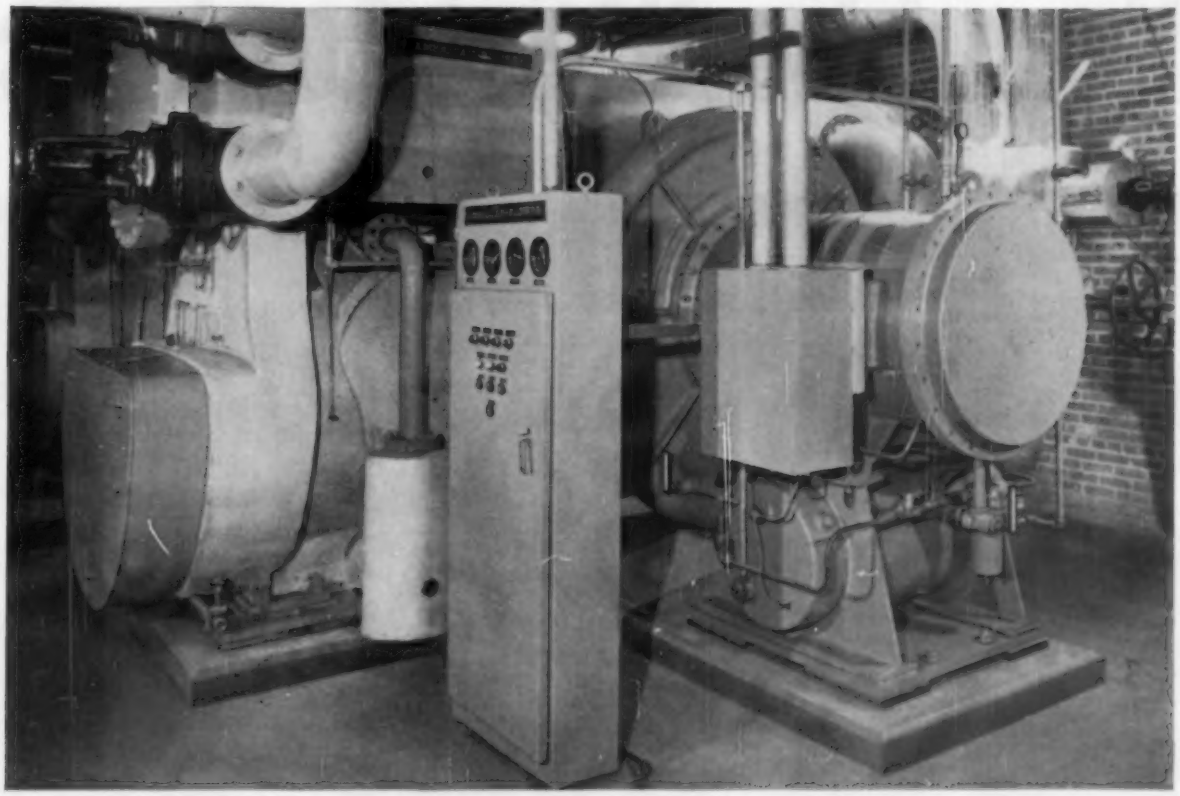
Another point sometimes overlooked is the cost reduction available from re-use of column forms, if the same size column is used throughout a multistory building. There may be, of course, a small increase in the amount of concrete used but this will usually be more than offset by savings in formwork. Steel column forms with capitals are now available for use in flat-slab construction.

THOR GERMUNDSSON, Manager
Structural and Railways Bureau
Portland Cement Association

For many years, the concrete masonry industry has believed in and advocated modular co-ordination in building design as one of the most logical ways to produce buildings more economically with no sacrifice in quality. . . . Practically all concrete masonry units produced today are of modular dimensions. There are limitations, but . . . the result . . . usually is a better looking job with some, although not large, savings in construction time and cost. It seems evident that the potential advantages of MODULAR ASSEMBLY will not be realized as long as the designer is forced to combine non-modular with modular materials. . . . When architects and builders really demand modular-sized building products.

(Continued on page 230)

AMERICAN BLOWER AIR CONDITIONING



Two 350-ton American Blower Tonracs supply chilled water for the entire Sheraton air-conditioning system.

Tonrac®—heart of the air-conditioning system in Philadelphia's new Sheraton Hotel

To help extend a traditional Sheraton welcome to travelers in the City of Brotherly Love, engineers, builders and mechanical contractors selected two American Blower Tonrac Centrifugal Refrigerating Machines to supply the air-conditioning system in the new Sheraton Hotel.

They chose Tonracs on the basis of their high capacity; their quiet, vibration-free operation; and American Blower's engineering know-how and reputation as a leader in the air-handling and air-conditioning field. The Tonracs supply all the chilled water for 1,000 individual American-Standard Remotaire room units that air-condition 5,700,000 cubic feet of space.

When your client's plans call for air conditioning—call our nearest branch office for invaluable product information. American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

The 22-story Sheraton Hotel, Philadelphia. Tonracs, installed on the fourth floor, operate so quietly that guests on adjoining floors never hear a sound.

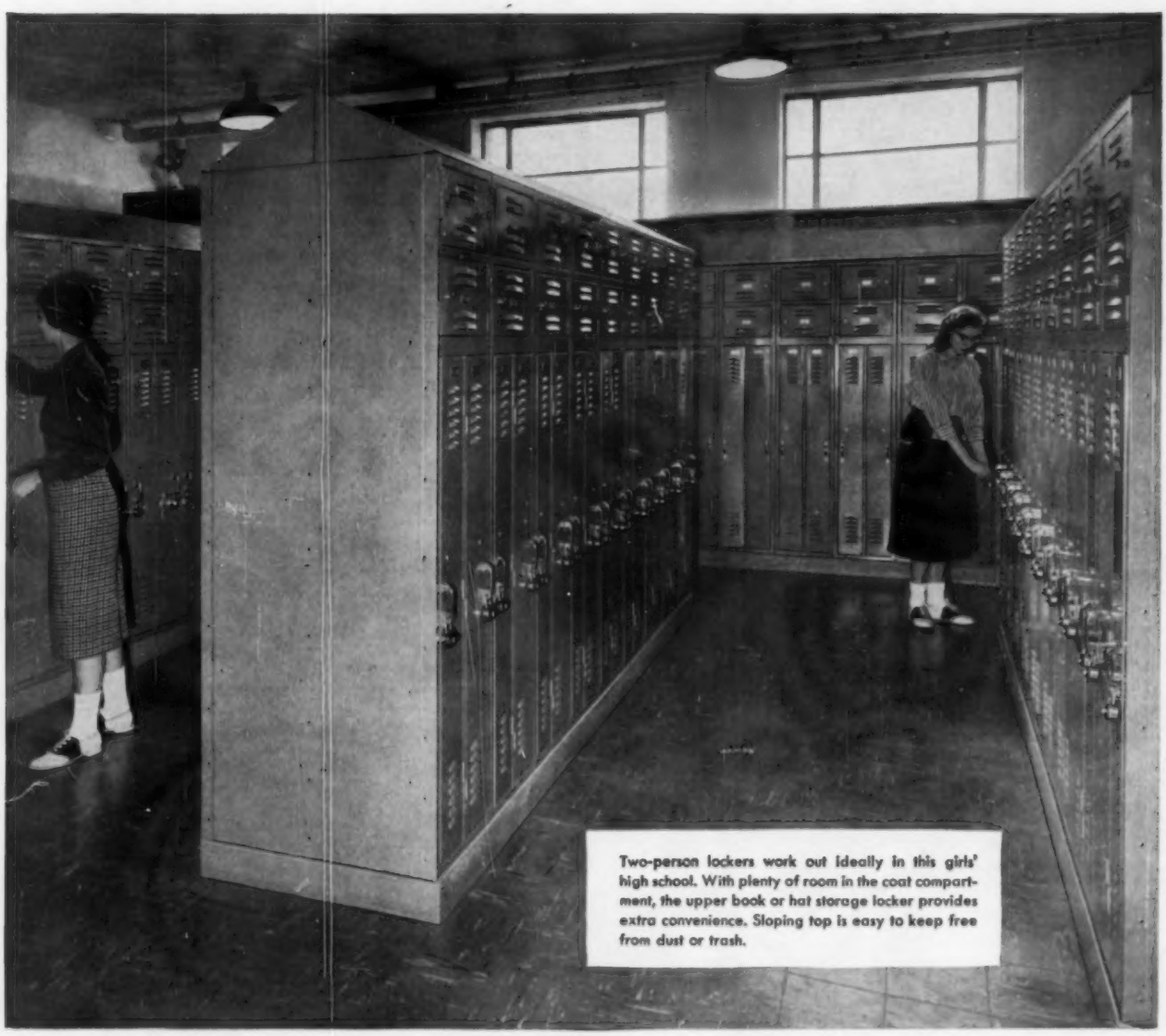
Building Credits
Architects: Perry, Shaw, Hepburn & Dean
Consulting Engineers: Slocum & Fuller
Builders: McCloskey & Co.
Mechanical Contractors: Ambrose-Augusterfer Corp.

AMERICAN BLOWER

Division of AMERICAN-Standard

QUALITY PROTECTS YOUR INVESTMENT . . . AMERICAN-Standard QUALITY IS AVAILABLE AT NO EXTRA COST

Republic Steel Lockers



Two-person lockers work out ideally in this girls' high school. With plenty of room in the coat compartment, the upper book or hat storage locker provides extra convenience. Sloping top is easy to keep free from dust or trash.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

Head the Class

BONDERIZED for Years of Service

For better than 65 years, school principals and superintendents have come to rely on the wide range of choice, the adaptability and long service of lockers made by the Berger Division of Republic Steel.

Now, to make them better than ever, Republic Steel Lockers are made of *Bonderized* steel. This gives improved paint adherence that resists the damage due to scuffing, scratching and bumping.

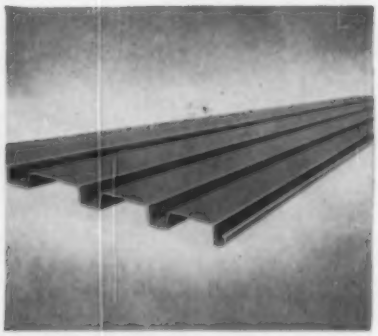
If you are planning on a locker installation in the near future, talk it over with some of your associates. Chances are that they've been using Republic Lockers and know from firsthand experience that they head the class for new or replacement installations.

You can get Republic Lockers in padlock, key-operated or combination-lock types. What's more, Berger Division of Republic Steel offers architects and school administrators a complete planning and installation service—recommending the right type and size for your needs—and seeing it through to complete installation.

If you have any question, either drop the coupon in the mail or call your local Republic Steel Berger Division representative for complete specifications and prices.

Vision-Vent Window Walls, made by Truscon Division of Republic Steel, are fast becoming standard specifications in school construction. They are installed fast—reducing costs and giving the maximum of daylight and ventilation.

It's a natural tendency to let architect or contractor select steel joists. But before you approve the specifications, here's something to think about. Truscon "O-T"® Joists have the seal of approval of the Steel Joist Institute. Don't take a chance on inferior quality. Specify the best—Truscon.



Here's something brand new to help reduce school construction costs. Truscon Ferrobord® is now available in a new design that's four times as wide. That means roof decking is applied faster. Twenty-four-inch Ferrobord is light, strong and fire-resistant. Mail the coupon for full specifications.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. C-3950
3186 EAST 45th STREET, CLEVELAND 27, OHIO

May I have more facts on the Republic products checked?

- ☐ Republic Steel Lockers
- ☐ "O-T" Steel Joists
- ☐ Truscon Vision-Vent Walls
- ☐ 24-Inch Wide Truscon Ferrobord

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

spokesmen

(Continued from page 226)

manufacturers will not be slow in producing them.

R. F. COPELAND, Director of Engineering
National Concrete Masonry Association

The kitchen-cabinet industry has been producing on the modular system for many years. Wood-kitchen-cabinet manufacturers use the 3-in. module and deliver completely finished cabinets with hardware attached to the building site ready for installation.

RICHARD C. CHAPMAN, Secretary
Mutschler Brothers Company
President
National Institute of Wood Kitchen Cabinets

The manufacturers of structural clay products have championed the cause of Modular Measure since its pioneer days before World War II. The Structural Clay Products Institute has used all of its resources, national and regional, to advance the cause of modular dimensioning. In addition, clay products manufacturers have, with increasing numbers, made their products available in modular sizes.

It is interesting to note that in 1955, the Mason Contractors Association of America passed a resolution that it "approves and encourages the use of Modular Measure in masonry structures." Earlier that year, the Bricklayers, Masons and Plasterers International Union, AFL-CIO, became the first building trades union to endorse this construction principle.

With every passing year, it becomes apparent that Modular Measure is progressing toward the day when it will be the accepted standard throughout the design profession. When that day comes will depend on the co-operation of all facets of the construction industry—architects, materials producers, contractors, and builders. For this reason, we hail the formation this summer of the Modular Building Standards Association in which all of these groups meet on the common ground of Modular Measure.

DOUGLAS WHITLOCK, Chairman of the Board
Structural Clay Products Institute

We approve of modular dimensions. All the members of our Association . . . standardize on sizes 12-in., 16-in., 20-in., and 24-in., which lend themselves to MODULAR ASSEMBLY.

WM. A. O'HARA, Secretary
National Mineral Wool Association

From experience we know that MODULAR ASSEMBLY is definitely one of the answers to the high cost of construction. . . . MODULAR ASSEMBLY is essential in all buildings, of that there is no doubt; however, it becomes paramount, in our opinion, where industrial buildings are concerned.

A. GEORGE MALLIS, Alternate Chairman
Technical Committee, Structural Division,
American Society of Civil Engineers

The persistence of the modular principle in building construction with various vicissitudes through a quarter of a century must indicate that there is embraced within the idea a truth that offers many advantages to the entire industry. Without doubt there is a resistance to Modular Measure . . . but the end result—more building for less money—will undoubtedly force an acceptance of the modular principle.

M. EDWIN GREEN
Lawrie & Green, Architects
AIA Representative
Modular Building Standards Association

We have had considerable experience in putting together a modular school . . . our organization has been combating the so-called package or prefab school on a positive basis and this is our solution.

RONALD S. SENSEMAN, Architect

As an industry we fully recognize and appreciate the value of MODULAR ASSEMBLY, with its increased efficiency and lower construction costs. The plumbing fixture industry was one of the pioneers of dimensional standardization of products. . . . Conformity to a module certainly poses serious problems . . . nevertheless we are confident that there will

(Continued on page 234)

SPECIFY

Puffer-Hubbard Refrigerators

For "Lifetime" SERVICE

Model 40-4
Pass-Thru
Self-Contained

UL Approved

Model 66-3
Self-Contained

Featuring the last word in modern streamlined styling and design, the new Puffer-Hubbard Refrigerators and Freezers meet every need for the refrigerated storage of perishable foods in schools, restaurants, institutions and bakeries. Architects and food consultants are quick to appreciate their many exclusive lifetime features.

SUPERIOR FEATURES INCLUDE:

- Exclusive "Grad-U-Matic" and Dual Fan Mullion Coil cooling systems assure positive cooling top and bottom.
- Choice of various combinations of Porcelain, Stainless Steel and Aluminum finishes — exteriors also available in colors.
- Automatic defrosting on all models.
- Heavy Electric-Welded Steel Frame Construction.
- 3½" to 4" Vapor-proofed Fiberglass Insulation.
- All Mullions Protected From Sweating.
- Heavy Duty Condensing Units pull out for cleaning — all units tested 15 to 24 hours with operation chart.
- Optional Vap-O-Matic Drain requires no plumbing hook-up.
- Interchangeable Interior accessories include adjustable Shelves, Salad Tray Racks or Bun Pan Slides.
- Complete Sales and Field Service in every state.

Also AVAILABLE — A complete line of Reach-In, Pass Thru and Salad Refrigerators . . . Upright Storage Freezers . . . Baker's Freezers and Dough Retarders . . . Two-Temperature Refrigerators . . . 22 to 96 cu. ft. Capacities . . . Dry Beverage Coolers . . . and Walk-In Coolers and Freezers.

WRITE FOR CATALOG

See Our Complete File In Your Current Sweet's Catalog

PUFFER-HUBBARD REFRIGERATOR CO.
GRAND HAVEN, MICHIGAN
EXPORT OFFICE — PUFFER-HUBBARD INTERNATIONAL
440 Lafayette St., New York City — Cable "MANREFSUP"

Its site, size and style collaborate to make the Marriott Motor Hotel a striking new spectacle in Washington, D. C. Located on U. S. Highway 1 at the Arlington end of the Twin Bridges over the Potomac, the Marriott is right in the middle of the District's Virginia front yard.

Hot Shoppes, Inc., which has $5,000,000 invested in the Marriott, took full advantage of the strategic location by making it not only the largest motor hotel built to date (360 guest rooms) but one of the most arresting, architecturally. Completed in January, it was designed by Joseph G. Morgan, A.I.A.

An L·O·F Interview with

J. WILLARD MARRIOTT *President*

HOT SHOPPES, INC., *Washington D. C.*

Subject: MOTOR HOTELS

L·O·F GLASS

Question: You have barely begun operation, but would you care to say anything about the Marriott's success to date?

Mr. Marriott: It has been a fine success in occupancy. We have been filled almost every night since the cherry blossoms opened the Washington tourist season.

Continued on next page

Question: Do you think your fine location is responsible for the high rate of occupancy?

Mr. Marriott: Being where we are—in Washington and at this particular spot—certainly helps. But the physical attractiveness of the Marriott is a most important factor, too. People buy what they see and like. The good design of the Marriott is a strong invitation to people to stop and stay here.

Question: They make their first stop at your glass-enclosed registration office outside the hotel. How does this drive-in method of registering work out?

Mr. Marriott: It is, of course, a great convenience to motorists to be able to register without getting out of their cars. Beyond that, we think they are less hesitant to stop and inquire about our rates, accommodations and so on, when they see they can do so right from their cars. It's true that talking to them through glass is a little impersonal, so our clerks have to be very cordial and take care not to offend when we're filled. But it works out fine.

Question: While being registered, passengers have a clear view into the dining room across the way. Isn't that good?

Mr. Marriott: It most certainly is. A good place to eat is on every motorist's mind, and they can't help seeing our dining room through the big plate glass windows. Conventional hotels are apt to tuck dining rooms in some plushy, exclusive corner where guests are timid about going. We display ours, and the modern openness —plate glass windows facing the pool and patio outdoors —makes the room attractive to people. It sell meals.

Question: This same feeling of openness is characteristic of the design of most of your Hot Shoppes, isn't it?

Mr. Marriott: Yes, we have found that for popular-priced restaurants, the "seeing in and seeing out" feature is an important part of the design. So we have used big plate glass windows wherever we could.

Customer convenience par excellence . . . registration without even leaving the wheel. Registration clerks are protected from weather in the glass-enclosed office.

Rooms at the Marriott feature big windows for pleasant views and a feeling of spaciousness. They are double-glazed for guests' comfort and quiet.

Question: Your guest rooms, too, have large windows and they are double-glazed. Why?

Mr. Marriott: Two panes in every window, set in neoprene stops, solves the noise problem. From inside our rooms, one can just faintly hear the planes, as if they were miles away, taking off from the National Airport nearby, or the trains that run nearby, or heavy highway traffic in front. The windows, doors, and wall structure are all *designed* to make Marriott rooms quiet—and they *are*.

Question: You've been serving meals to the public successfully for many years. What trends do you see in serving people's hotel needs?

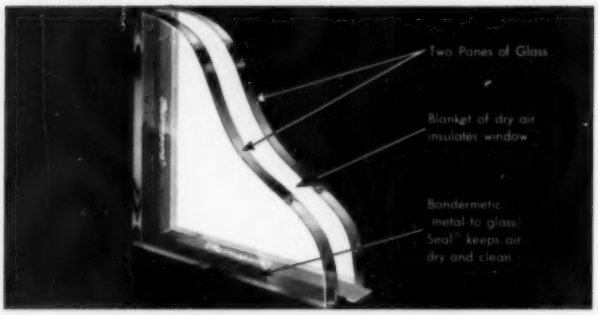
Mr. Marriott: As can already be seen, more new *motor* hotels than *conventional* hotels will be built in or near the heart of our cities. These two- to four-story motor hotels and the smaller, more rural motels will be upgraded. Rooms will be more luxurious, nicely decorated, well furnished and have a feeling of spaciousness. Upgrading rooms will mean higher rate of occupancy and higher revenue. At least we think so, and we propose to build more motor hotels like the Marriott.

The light, airy feeling of the Marriott is beautifully expressed in the main lounge. Patrons look through a huge window wall to a patio and swimming pool.

L·O·F GLASS FOR MOTOR HOTELS

PARALLEL-O-PLATE®

To keep distorted reflections from spoiling the appearance of your building, use *Parallel-O-Plate* Glass in the windows. It is *twin-ground* for more freedom from distortion. The glass in the two demonstration windows shown here is backed with black composition board to simulate the mirror effect of windows in a building. In the window at the left, glazed with *Parallel-O-Plate*, the reflections are mirror-perfect. In the other, glazed with sheet glass, note the distorted reflection.

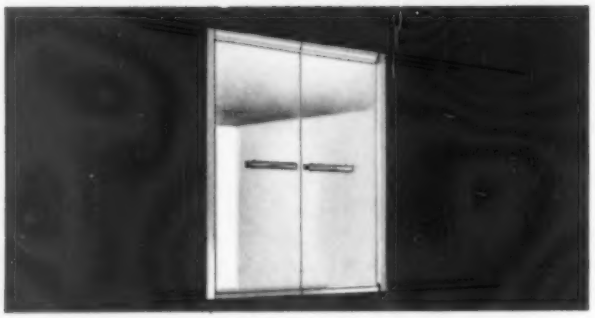


THERMOPANE®

For maximum comfort and for heating and air-conditioning economy, use *Thermopane* insulating glass in windows. The heat loss that you would get through ordinary glass is cut almost in half. Drafts are reduced to increase comfort close to windows. *Thermopane* even deadens outside noise that would distract building occupants. For maximum air-conditioning efficiency, specify Heat Absorbing Plate Glass in the outer pane. *Thermopane* is available in over 100 standard sizes to fit most standard sash.

VITROLUX®

What could go better with windows than glass? This new color-fused, heat-strengthened polished plate glass for spandrels gives the whole facade a oneness of luster and maintenance-free beauty. To illustrate the effect, we laid out four colored samples plus a piece of clear plate glass (at top) and reflected a building in them. Notice the unity in the reflections. *Vitrolux* comes in 16 standard colors plus black and white. Standard maximum panel size: 48″ x 84″. Special orders up to 60″ x 84″. Thickness: ¼″ plus 1/64″ minus 1/32″.



TUF-FLEX® DOORS

These frameless, clear-glass doors seem to invite visitors into a building. And they can withstand, with virtually no maintenance, all of the traffic they help create. Made of ½″-thick or ¾″-thick tempered plate glass, they are 3 to 5 times tougher than regular plate glass of the same thickness. There are 16 types in finished sizes up to 48″ in width and 108″ in height. *Tuf-flex* Doors are furnished complete, equipped with cast bronze or alumilited aluminum fittings which are designed to take standard pivot hinges and builders' hardware.

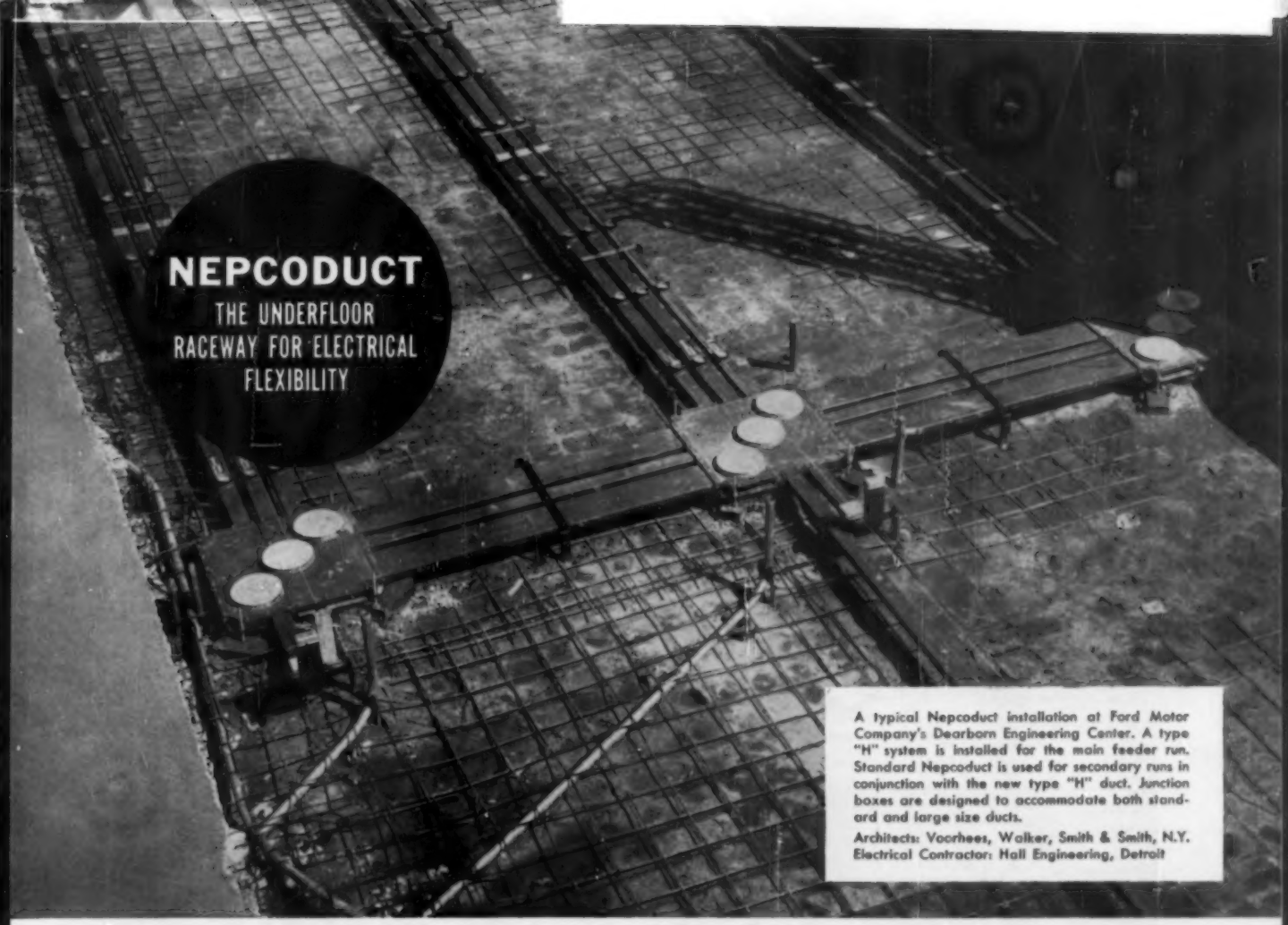
• For complete information on any of these L·O·F products, call your L·O·F Distributor or Dealer (listed under "Glass" in the yellow pages). Or write to Libbey·Owens·Ford Glass Company, 608 Madison Ave., Toledo 3, Ohio.

AP-703

L·O·F GLASS

glass FOR CURTAIN WALLS

LIBBEY·OWENS·FORD GLASS COMPANY
TOLEDO 3, OHIO



A typical Nepcoduct installation at Ford Motor Company's Dearborn Engineering Center. A type "H" system is installed for the main feeder run. Standard Nepcoduct is used for secondary runs in conjunction with the new type "H" duct. Junction boxes are designed to accommodate both standard and large size ducts.

Architects: Voorhees, Walker, Smith & Smith, N.Y.
Electrical Contractor: Hall Engineering, Detroit

FORD standardizes on larger capacity underfloor raceways for main feeder runs . . .

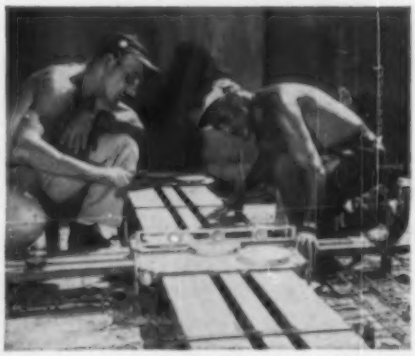
New National Electric "H" System used in Dearborn Engineering Center and Rawsonville office buildings

A type "H" system, the latest addition to National Electric's standard Nepcoduct Underfloor Raceway line, has been specified by Ford Motor Company. It will provide full electrical distribution throughout floor areas at the new Dearborn Engineering Center and Rawsonville Office Buildings.

Type "H" Nepcoduct, with a cross section of 1⅜" x 6⅜", has increased capacity to accommodate the large size cable feeds required to serve modern power and telephone facilities. It is especially suited to the growing electrical needs of network teletype, data processing and extensive communication equipment.

All Nepcoduct components including type "H" can be installed as a one, two or three duct system with large hand hole openings in junction units to provide easy access to power, light and communications systems. Adaptable to any type of floor construction, Nepcoduct makes outlets available wherever they are needed for efficient office layout. Electrical service changes can be made quickly and at low cost to the owner or tenant . . . without interrupting business routine.

When you build, specify NE Nepcoduct to be sure the building will never grow old electrically. Write for complete information today.



Quick and economical to install, Nepcoduct provides separate wiring facilities for light, power, inter-communication and telephone. Streamlined service fittings less than three inches high are provided with standard receptacles of 15 to 50 amperes capacity and with bushed openings for telephone and intercom use.

National Electric Products

PITTSBURGH, PA.
2 Plants • 12 Warehouses • 41 Sales Offices

(Continued from page 230)

be an accelerating swing by the entire building industry to modular co-ordination and the prefabrication of components in the coming years.

WM. E. KRAMER, Secretary
Plumbing Fixture Manufacturers Association

Our industry cannot standardize to the same extent as the manufacturer of bricks or window units unless architectural design itself is standardized. This would restrict freedom of thought, expression, and choice. On the other hand, the industry can and does deliver to a job-site complete fabricated or modular building components which are standardized in the sense that they are interchangeable on the given job. An example of this part standardization would be the two warehouses near Washington, D. C. ... one with a million and the other with one-half million square feet of floor area. These buildings were covered with approximately one thousand timber roof trusses which were completely fabricated in Oregon and shipped to Virginia as unassembled component parts. They were assembled with no additional cutting or fitting being required as the truss parts were completely interchangeable. The buildings were erected in record time. Engineered timber fabricators make their living doing this type of work every day.

Through the American Institute of Timber Construction, our industry, which is concerned with designing, fabricating, and erecting engineered timber construction and manufacturing structural glued laminated lumber, has issued standards covering practically all important phases of our operations. These cover such items as cross-sectional dimensions of, and appearance grades for, glued laminated members, design, fabrication, and erection procedures for sawn and glued laminated members, industry trade practices, and many other items. Design is best and most economical when, in addition to solving the design problem on a specic basis, these standards are employed, even though they may not be set up in terms of Modular Measure.

FRANK J. HANRAHAN, Executive Vice-President
American Institute of Timber Construction

For years we have manufactured building materials which have been made to modular sizes. Our experience has been that much time and effort are saved on the part of everyone concerned in the layout and construction of the building when the design is based on modular principles and modular component parts are used.

ROY C. KENDALL, Manager
Technical Services
Kimble Glass Company

In my opinion, MODULAR ASSEMBLY is one of the greatest strides forward of the past few decades in the construction industry, and is as significant, as far as potential for progress in construction methods, as is automation in industry.

FRANCIS M. TOMPKINS, Engineer
Senior Vice President
Charles H. Tompkins Co.
General Contractors

Modular Measure as a definite economy measure, as an aid to speeding construction, and as a great factor in producing better workmanship and a finer finished product, cannot be any longer overlooked or disregarded by anyone vitally interested in the future of construction in the United States.... Looking back a few years from now, I believe it will be regarded as the greatest single forward step of the construction industry in the first half of the 20th Century.

JAMES E. COOMBS, President
Baker & Coombs, Inc.
Director,
Modular Building Standards Association

The phrase *modular design* contains no magic. Its significance lies in the wise use of the design concept. The metal window industry is confronted with the same modular problems as other industries, except that in the façade of a building, fenestration is a tremendous factor in eye appeal.... The industry is proud to have finalized window opening widths of 20-in., 40-in., 60-in., 80-in., plus a

(Continued on page 240)

Memorial elementary school,
Burlington, Massachusetts
Architects: Edgar T. P. Walker and
Theodore B. Hanna, Boston
Contractor: Joseph Rugo, Inc., Boston

Gymnasium beams are 22 ply with
53'2" span
Classrooms have 28'11" x 5¼" x 14⅝"
beams

RILCO
works wonders with wood

RILCO LAMINATED PRODUCTS, INC.
W817 First National Bank Building
Saint Paul 1, Minnesota

One Good (School) Leads To Another

"Rilco laminated-wood beams were an extremely successful part of the structure" in keeping the bid below the budget, says the architect. The beams saved time — "roof framing over one 10-classroom wing was erected by three pair of men in four days." And the inherent beauty of wood meant economy for "the laminated-wood beams were left exposed throughout the school." And the "town approved . . . we are now building another similar 20-room school."

But appearance and economy aren't the whole story. Rilco beams, arches and Rilco wood deck mean fire safety for schools, churches, industrial and commercial buildings.

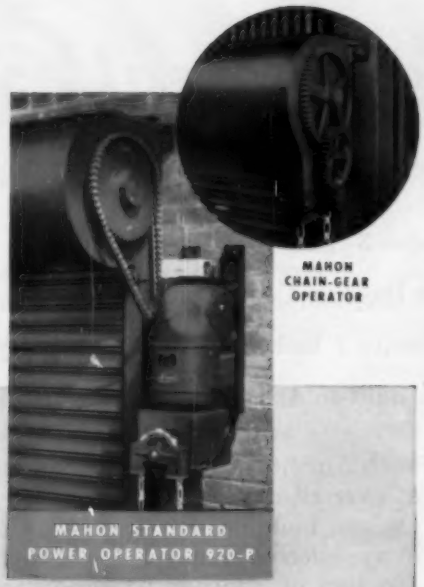
There's a cost-saving Rilco member for every type of structure — engineered to your specification. For more information contact your nearest Rilco office.

District Offices:
Fort Wayne, Indiana
Newark, New Jersey
Tacoma, Washington

Rolling Steel Doors

Manually, Mechanically or Electrically Operated

Here is another multiple door installation where only rolling steel doors could meet the operating and security requirements . . . because, the six doors illustrated below are installed in openings at the ends of six production lines where operating space and positive protection against intrusion were primary considerations. Sixteen other Mahon Rolling Steel Doors are installed in this new, modern boat-building plant. No other type of door can match the space saving compactness and the operating convenience of a good, quick-opening, quick-closing, power operated rolling steel door . . . the vertical roll-up action is fast, requires no usable space either inside or outside the opening—no overhead tracks or other obstructions to restrict headroom and interfere with crane handling adjacent to the door opening. And no other type of door can give you the positive security, firesafety and permanence which is an inherent advantage in Rolling Steel Doors . . . all-metal construction reduces maintenance to a negligible factor, and assure a lifetime of continuous trouble-free service. When you buy a rolling steel door, it will pay you to check specifications carefully . . . you'll find that Mahon Rolling Steel Doors are built better to give you better service over a longer period of time—for instance, the galvanized steel in Mahon curtain slats is BONDERIZED and DIP-COATED with synthetic enamel which is baked on at 350° F. prior to roll-forming. This is just one of the extra-value features of Mahon Rolling Steel Doors . . . comparison will disclose many others that add up to a much better investment. See Sweet's Files for information, or write for Catalogue G-58.



THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Fire Walls; Insulated Metal Curtain Walls; Electrified M-Floors; Acoustical and Troffer Forms; and Steel Roof Decks and Long Span M-Decks.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Six of Twenty-Two Mahon Rolling Steel Doors installed in a new plant for the Roamer Steel Boat Division of Chris-Craft Corporation, Holland, Michigan. Owen-Ames-Kimball Company, General Contractors.

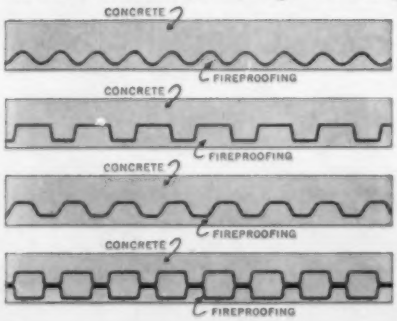
MAHON

Now ZONOLITE® Perfects LOWEST COST

Bonds Directly to

- ★ **Provides 3- and 4-hour Fire Ratings**
- ★ **Saves Days on Construction Schedules**
- ★ **Eliminates 7 inches of Height per Story**
- ★ **Gives Built-in Acoustical Benefits**

Typical Steel Floor Systems Using ZONOLITE® Direct-to-Steel Fireproofing



Now, with Zonolite direct-to-steel fireproofing, you can cut over-all costs of materials and construction. On one building, for example, a savings of $30,175 was effected simply by using this new technique in lieu of another fireproofing method. Zonolite direct-to-steel fireproofing "has everything"—it speeds work progress, provides three- and four-hour fire ratings—provides additional bonuses other fireproofings do not offer.

Zonolite direct-to-steel fireproofing amazingly sticks to the underside of steel floors, applies quickly by hand or machine—reducing former construction schedules by days. It provides its own attractive finish.

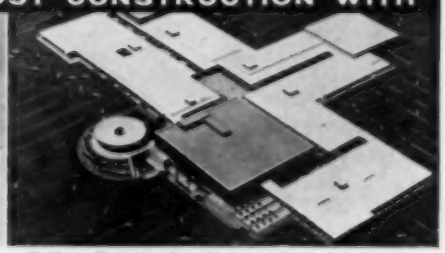
Sound-Conditions As You Fireproof!

This new direct-to-steel technique does more than fireproof—*it sound conditions!* Zonolite fireproofing

OTHER WAYS TO ACHIEVE FASTER, LOWER-COST CONSTRUCTION WITH

In Bedford, N. H., School, insurance savings quickly pay for the Zonolite Plaster Fireproofing and Zonolite Acoustical Plastic. Arch.: A. J. Majeski. Plast. Contr.: J. F. McGranahan.

3325 Wilshire Blvd., office building, Los Angeles, Calif., uses Zonolite Plaster Fireproofing and Zonolite Spandrel Back-up System throughout. Arch.: Victor Gruen. Plast. Contr.: Martin Bros.



Gulfgate Shopping City, Houston, Texas, has Zonolite Plaster Fireproofing throughout. Arch.: John Graham & Co. Plast. Contr.: Tobin & Rooney.

New Advanced Technique for FIREPROOFING

Underside of Steel Floors!

is composed of vermiculite and suitable binders with exceptional noise-reducing characteristics. The architect can often design so that further sound-conditioning is unnecessary.

Reduces Other Material Costs

With Zonolite direct-to-steel fireproofing you cut 7 inches from the height of each floor—a gain of one story in every 14 in multi-story construction, a saving on other construction materials.

Tenant Changes, Mechanical Alterations Easily Accomplished

Because the fireproofing is applied direct-to-steel—up high, out of the way—there is free access to the mechanical installations. Tenant changes are accomplished without cutting through the fireproofing in new or old buildings.

BE PREPARED to make the most of Zonolite direct-to-steel fireproofing. BE INFORMED on quick, sure, low cost fireproofing in all types of construction. Tear out the coupon now for FREE reference booklet giving ratings, application data, all details.

Typical ZONOLITE DIRECT-to-STEEL Fireproofing Installations

AAA Office, Kalamazoo, Mich. Fireproofed throughout with Zonolite applied directly to steel. Arch.: Louis Kingscott & Associates. Plast. Contr.: Ben Schuemann.

Zonolite Fireproofing was applied to underside of steel by machine in new-type steel roof at Phoenix, Ariz., Coliseum. Plast. Contr.: Gray Plastering Co.

Fireproofing direct to underside of steel floors in Bell Telephone Building, Pittsburgh. Arch.: Press & William C. Dowler and Associates. Plast. Contr.: Easley and Rivers.

ZONOLITE PLASTER FIREPROOFING AND ZONOLITE ACOUSTICAL PLASTIC

New York International Airport, Idlewild, N. Y., world's largest, is made fireafe with Zonolite Plaster Fireproofing throughout. Arch.: Skidmore, Owings & Merrill. Plast. Contr.: Mario & DiBono.

ZONOLITE COMPANY, Dept. PA-117
135 S. LaSalle St., Chicago 3, Illinois

Send me booklet PA-41 "Plaster and Acoustical Systems", and Data Sheet, PA-35 on "Direct-to-Steel Fireproofing".

Name_____

Firm_____

Address_____

City_____ Zone_____ State_____

ELECTRIC PLANT
NEWS

When power's off . . .

this electrical "appliance" protects home and family

Engine-driven Onan Electric Plant takes over automatically within seconds after power is interrupted

When highline power is off . . . for any reason . . . an Onan Emergency Plant supplies regular A.C. electricity for lights, refrigerator, freezer, furnace, water pump, electric stove . . . all other appliances and equipment. To protect the home even when occupants are not there, the plant can be equipped to start automatically when power is interrupted and stop when restored.

Install in garage or basement

An Onan Plant needs very little space. Vacu-Flo cooling assures a safe installation. The cost of an Onan Plant for the average home is about the same as a major appliance. Requires little attention; always ready to run.

In industry . . .

Mobile electric plants cut operating costs

Provide plug-in power for electric tools and lights anywhere! Save time and money. Models available which provide A.C. power for tools and lights and D.C. output to charge batteries for radio use. Eliminate high cost of running truck engine for battery charging.

500 to 75,000 watts A.C. Also D.C. and Battery Charging models

See our catalog in Sweet's or write for literature.

D. W. ONAN & SONS INC.

3853 Univ. Ave. S.E., Minneapolis 14, Minnesota • PHONE: FE 2-1155

ELECTRIC PLANTS • AIR-COOLED ENGINES • GENERATORS • KAB KOOLER

spokesmen

(Continued from page 236)

D-dimension of 7/16-in. at each jamb to accommodate framing. Since sills can be tailored to heights, the problem of vertical dimension is not so difficult. . . . Certain types of both aluminum and steel windows have their dimensions exactly on the grid and no problem of a D-dimension exists. . . . As modular planning becomes better understood and appreciated through experience and education, it is sure to become increasingly popular among architects.

R. L. CLINGERMAN, P.E., Consulting Engineer
The William Bayley Company

The hardboard industry, from the beginning, has recognized the economies of dustry have supported the trend to greater recognition of this basic design principle. The dimensions of hardboard panels offer basic economies: in standard 4-ft widths, cuts of 12, 16, 24 and 48 in. can be made without waste. Moving ahead with the MODULAR ASSEMBLY idea, hardboard manufacturers today are prefinishing and/or prefabricating hardboard away from the job: for example, grooved-hardboard panels to hide joints; special surfacing to obtain a variety of predecorated effects; stressed-skin precision-built panels for quick assembly; factory-primed hardboards; prefabricated hardboard siding.

DONALD LINVILLE, Executive Secretary
Hardboard Association

Currently 1" x 6"s or 1" x 10"s (with 2½" batten) applied vertically, can be used in 32-in. wall modules. Additionally, 1" x 6" board and batten can be used in 48-in. modules, and 1" x 10"s and 1" x 8"s can be laid up together in board on board pattern to both 32-in. and 48-in. wall modules. Lumber siding patterns are generally available in 2-ft increments. Siding in 4-ft multiples, precision end-trimmed at the mill, can be applied horizontally to conform to framing on either 2-ft or 16-in. modules. Also, the increased availability of end-and-edge glued pieces can be expected to help achieve panelized wall units made up of short pieces glued up to standardized lengths that will facilitate MODULAR ASSEMBLY.

PHILIP T. FARNSWORTH, Exec. Vice-President
California Redwood Association

We, as an association, believe in MODULAR ASSEMBLY and feel sure that it will be of increasing importance in the building industry in the years to come. Our prefabricated studs, our channel iron, and our metal lath are especially adapted, in our opinion, for structures where MODULAR ASSEMBLY governs.

DONALD R. WADLE, Managing Director
Metal Lath Manufacturers Association

As an architect and former member of ASA Committee A-62, I am firmly convinced of the value of the program toward

(Continued on page 244)

Some insulations feed a fire...

FOAMGLAS®

INSULATION won't burn!

—and only inorganic FOAMGLAS insulation offers all these added benefits... waterproof and vapor-proof (closed glass cell structure)... dimensionally stable... high compressive strength... vermin-proof... easy, economical to handle and install. Write for detailed literature.

FOAMGLAS is listed by Underwriters' Laboratories, Inc. under Label Service.

Pittsburgh Corning Corporation
Dept. AS-117 One Gateway Center, Pittsburgh 22, Pa.
In Canada: 57 Bloor Street West, Toronto, Ontario

This ultra-progressive elementary school at Morrilton, Arkansas was built through the Winthrop Rockefeller Rockwin Foundation..

How a dream school came true

Brunswick furniture and functional classrooms blend beautifully to create cheerful, efficient "living rooms for learning."

Ginocchio-Cromwell & Associates of Little Rock transformed the collective thinking of leading state and national educational agencies into a functional architectural blend of steel, concrete, aluminum and brick.

Brunswick flexibility in action is shown in this typical classroom scene. The furniture groups, moves, stacks and stores so easily, it fits today's teaching techniques perfectly.

. . . for just $12 a square foot

Can today's schools be planned for economy . . . and quality too? A noted philanthropist, a small city with big vision, and America's leading educational agencies proved it possible.

The result is this storybook school at Morrilton, Arkansas. It boasts today's most advanced features . . . yet cost well below the national building average.

Winthrop Rockefeller, himself an Arkansas resident, joined with Little Rock architects Ginocchio-Cromwell & Associates and Robert Harris and his Morrilton School Board in the planning. The project drew the enthusiastic interest and assistance of the U.S. Dept. of Education, The Arkansas State Dept. of Education and other state agencies.

These planners chose Brunswick Furniture because they considered it the only advanced line designed to function as an actual integral part of their coordinated teaching program. It offers the best investment not only in economy, but in beauty, efficiency and long life.

Capitalize on the decision of these nationally known authorities when you decide on school furniture and equipment . . . it can save you precious "per square foot dollars." Ask your representatives for the Morrilton Story. Or write The Brunswick-Balke-Collender Company, 623 South Wabash Avenue, Chicago 5, Illinois.

The only stacking line, Brunswick chairs and desks are here stacked out of the way for a group game. It is the most rugged of all classroom furniture, yet moves easily in an instant.

Brunswick cabinets on wheels combine in many arrangements to divide rooms into study and activity centers. Colors harmonize pleasingly with any interior or exterior.

Brunswick

the investment line

spokesmen

(Continued from page 240)

more efficient construction with impressive savings in cost. As . . . indication of our industry's belief in the advantages of modular design, we have for many years established standard sizes of all structural insulation board materials to fit the 4-in. module.

CHARLES M. GRAY, Manager
Insulation Board Institute

Our position as an industry is best expressed by the following excerpts (from a resolution adopted on January 2?, 1957). We have, over a number of years, made an effort to bring about standard sizes in appliances, as well as standard dimensions in buildings. "The kitchen cabinet industry recognizes the established . . . 4-in. modular increment (although) the industry presently uses the 3-in. modular system for these component units. It is the recommendation of the Steel Kitchen Cabinet Manufacturers Association and the National Institute of Wood Kitchen Cabinets, therefore, that architects and builders provide *even foot dimensions* in kitchens or areas in which cabinets and appliances are to be installed. This will then accommodate either 3-in. or 4-in. modules."

ARTHUR J. TUSCANY, Executive Secretary
Steel Kitchen Cabinet Manufacturers Association

MODULAR ASSEMBLY is standard practice with many architects and the number is growing. Co-ordination of dimensions of building materials and equipment is essential for the elimination of waste and the reduction of installation time, with resultant reduction of building costs. A campaign for education of the building industry and the general public describing the benefits of modular dimensioning is badly needed . . . our association has consistently supported the modular program.

O. C. LANCE, Secretary-Manager
National Woodwork Manufacturers Assoc., Inc.

In a literal sense, the structural steel fabricating industry has from its early inception used MODULAR ASSEMBLY, as defined by P/A. For example, the structural components of a steel-framed building are shop-fabricated from structural shapes that have been standardized in dimensions for many years. . . . Perhaps the most outstanding and far-reaching development in the entire field of multistory steel-framed buildings is that known as "lightweight" construction, brought to its present state of development through the activity of many allied industries. Steel floor, roof and wall elements, each standardized and mass produced, have been combined with other materials of construction such as lightweight concrete, lightweight fire-resistive plasters, and various insulating and acoustical materials to form light and efficient floors and roofs and thin, light, and architecturally effective walls. . . .

(Continued on page 248)

THE CEILING: FORESTONE

LaTorre Restaurant
San Francisco, California
General Contractors:
Reliable Alterations
Acoustical Contractor:
Cramer Acoustics

Economical Forestone is available through the following Simpson Certified Acoustical Contractors:

ALABAMA
Badham Insulation Co., Inc., Birmingham
Shook and Fletcher Insulation Company, Birmingham
Stokes Incorporated, Mobile

ARIZONA
Fiberglas Engineering & Supply, Phoenix
Hall Insulation & Tile Co., Tucson

ARKANSAS
Buck Hendershott Company, Little Rock

CALIFORNIA
Coast Insulating Products, Los Angeles
Cramer Acoustics, Fresno and San Francisco
John K. Haas Company, San Diego
H. W. Rivett Company, Sacramento

COLORADO
Construction Specialties Company, Denver

CONNECTICUT
Wilson Construction Company, Hartford

FLORIDA
Anning-Johnson Company, Miami
Anning-Johnson Company, Tampa
Center Brothers, Inc., Jacksonville

GEORGIA
Anning-Johnson Company, Atlanta
Center Brothers, Inc., Savannah

IDAHO
Fiberglas Engineering & Supply, Boise
Idaho Acoustical & Building Specialties Co., Boise

ILLINOIS
General Acoustics Company, Chicago
George S. Grimmett & Co., Champaign, Decatur and Springfield

INDIANA
The Baldus Company, Fort Wayne
E. F. Marburger & Son, Inc., Indianapolis

IOWA
Lamoreaux and Assoc., Inc., Marshalltown

KANSAS
Ecoff & Co., Wichita

KENTUCKY
Atlas Plaster & Supply Company, Louisville

LOUISIANA
King & Co., Inc., New Orleans

MARYLAND
Lloyd E. Mitchell, Inc., Baltimore

MASSACHUSETTS
Acoustical Contractors, Inc., Brighton

MICHIGAN
Detroit Acoustical Contracting Co., Detroit
Grand Rapids Acoustical Co., Grand Rapids and Lansing

MINNESOTA
Dale Acoustics, Inc., Minneapolis

MISSISSIPPI
Stokes Incorporated, Greenwood
Stokes Incorporated, Jackson

MISSOURI
Hamilton Company, Inc., St. Louis
B. J. Lutz, Inc., Kansas City
Midwest Services, Inc., Joplin

NEBRASKA
Kelley Asbestos Products Co., Omaha

NEW JERSEY
Connor & Company, Inc., Kenilworth
Kane Acoustical Company, Inc., Fairview

NEW MEXICO
Fiberglas Engineering & Supply, Albuquerque

NEW YORK
Buffalo Acoustical Corporation, Buffalo
The Cronin Acoustical Co., Stoney Point
Davis Acoustical Corp., Albany
Davis-Fetch Acoustical Corporation, Syracuse
Davis-Fetch & Company, Inc., Buffalo and Jamestown
Robert J. Harder, Inc., Lynbrook, L. I.
James A. Phillips, Inc., New York
Rochester Davis-Fetch Corp., Ithaca and Rochester

NORTH CAROLINA
The Bonitz Insulation Co., Greensboro, Goldsboro and Asheville
Bost Building Equipment Co., Charlotte

OHIO
Acoustical Contracting & Supply Corp., Cleveland and Youngstown
Cincinnati Floor Company, Cincinnati
Riethmiller Acoustic Company, Columbus

OKLAHOMA
Denman Floors Company, Oklahoma City
Harold C. Parker & Company, Oklahoma City
Midwest Marble & Tile Company, Tulsa

OREGON
Commercial Tile Company, Eugene
R. L. Elfstrom Company, Salem
Johnson Acoustical & Supply Co., Portland

PENNSYLVANIA
Acousti-craft, Inc., Philadelphia
Standard Floor Company, Pittsburgh

SOUTH CAROLINA
Bonitz Insulation Co., Columbia

TENNESSEE
Alexander Marble & Tile Company, Memphis
Anning-Johnson Company, Knoxville

TEXAS
Blue Diamond Company, Dallas
Builders Service Company, Fort Worth
Collins Roofing & Sheet Metal Company, Odessa
General Supply Company, Inc., Houston and San Antonio
Houser Resilient Floors Co., El Paso
Raymond Rambo Materials Co., Corpus Christi

UTAH
Utah Pioneer Corporation, Salt Lake City

VIRGINIA
Anning-Johnson Company, [illegible]andria
Manson-Smith Company, Inc., Norfolk and Richmond

WASHINGTON
Elliott Bay Lumber Company, Seattle
Fiberglas Engineering & Supply, Spokane

WEST VIRGINIA
Asbestos & Insulating Co., Charleston

WISCONSIN
Building Service, Inc., Appleton and Milwaukee

WYOMING
Construction Specialties Company, Casper

CANADA
F. Drexel Company Limited, Edmonton, Alberta, Vancouver, B. C., Victoria, B. C. and Calgary, Alberta
Hancock Lumber Ltd., Edmonton, Alberta

HAWAII
Hawaii Builders Supply Company, Limited, Honolulu

SIMPSON CERTIFIED Simpson ACOUSTICAL CONTRACTOR

The Contractors above also install these other Simpson acoustical materials: Hollokore-drilled Perforated Tile—standard and scatter drilled, Acoustical Roof Slab, Fissured Mineral Tile, Metal Acoustical Units, Perforated Hardboard, Perforated Cement Asbestos Board. AC-78

SIMPSON LOGGING COMPANY
1010 WHITE BUILDING, SEATTLE, WASHINGTON
General Offices in Shelton, Washington

John La Torre, owner, and Martin van London, chef, of La Torre's well known San Francisco restaurant, receive continuous praise from guests who have enjoyed the food, the wine and the quiet and elegant atmosphere.

Attractive, Economical Sound-Conditioning— A Most Important Part of Good Building Design

Simpson Forestone is the world's first fissured woodfiber acoustical tile. Its random textured surface adds beauty and warmth to the design of any building and the decor of any room. Its sound absorption efficiency is comparable to that of standard perforated woodfiber acoustical tile. *And Forestone costs no more than the popular thicknesses of perforated woodfiber tile.*

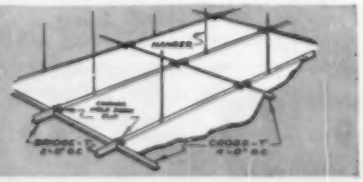
Forestone is available in 12″ x 12″ and 24″ x 24″ tiles, installed by nailing, cementing or hanging in mechanical suspension systems; in 12″ x 23¾″ tiles for exposed Z and T suspension systems; in 12″ x 24″ flange-jointed tile for easy nailing or stapling; and as 24″ x 24″ and 24″ x 48″ ceiling board to fit exposed grid suspension systems. The La Torre Restaurant installation (shown above) is Forestone Ceiling Board.

Consider Forestone when you are planning or designing your next job. It quiets rooms—beautifully and economically! You can get full information about Forestone from your nearest Simpson Certified Acoustical Contractor (see list on opposite page).

Simpson Forestone®

FISSURED WOODFIBER ACOUSTICAL TILE

FORESTONE CEILING BOARD INSTALLATION



Forestone® Ceiling Board is made to fit exposed grid suspension systems, which are composed of lightweight inverted T-sections into which the board is laid. The grid is usually suspended directly without the necessity for 1½″ channels. The individual boards may be removed for easy access to ventilating and utility lines above the suspended ceiling.

®Reg. U.S. Pat. Off.—U.S. Pat. No. 2,791,289

COMMERCIAL POWER DISTRIBUTION

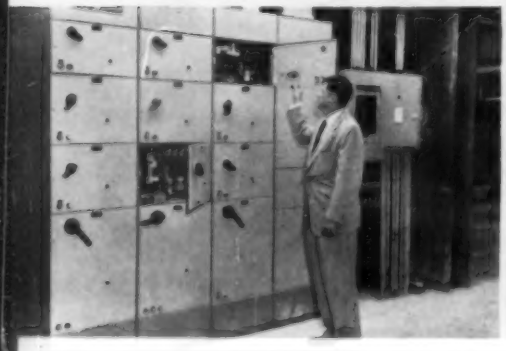
SAVINGS OF $90,000 were obtained using G-E 480Y/277-volt systems in Exchange Bank, Braniff Building in background.

General Electric system-engineered equipment

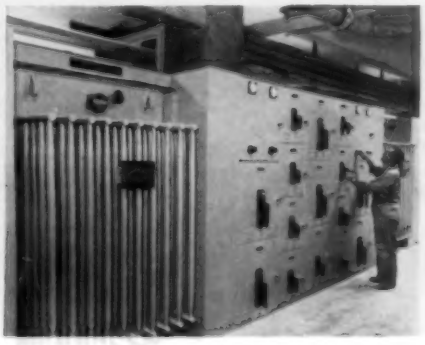
PLANNING: W. Marshall, J. Glendinning, G-E; consultants J. M. Guerrero, E. B. Gamble; G. M. Bostock, Park V. P.

HIGH VOLTAGE LIGHTING at 277 volts creates savings by combining light, power source. Modular design permits flexibility.

ECONOMICAL power distribution is provided by feeder busway. 30 kva, 110-V transformer serves office equipment.

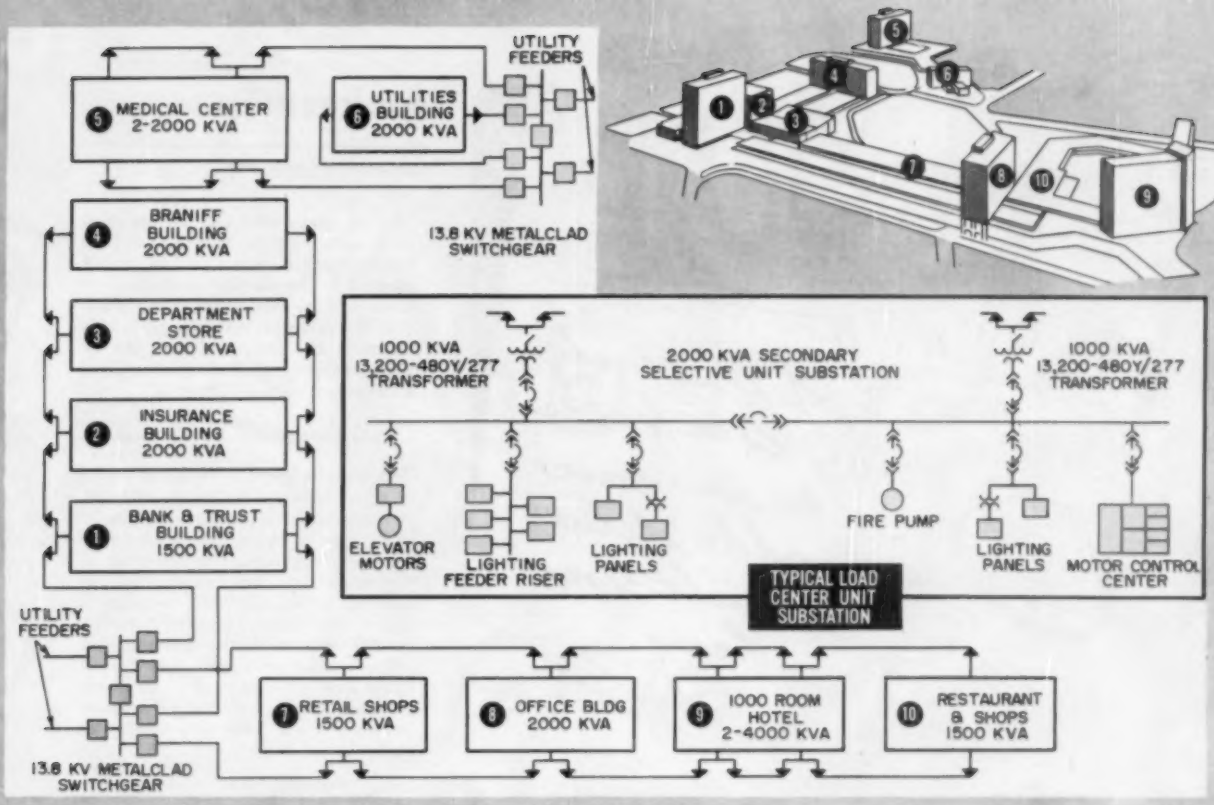


COMPACT G-E Type DA7093 motor control center takes power from feeders to control all motors safely.



1500 KVA double-ended load center unit substation is typical of the units that will supply power in Exchange Park buildings.

PROJECT POWER is from two line-ups of G-E 13.8 kv metalclad switchgear. Unit shown is located in Bank basement.


UTILITY FEEDERS
5 MEDICAL CENTER 2-2000 KVA
6 UTILITIES BUILDING 2000 KVA
4 BRANIFF BUILDING 2000 KVA
13.8 KV METALCLAD SWITCHGEAR
3 DEPARTMENT STORE 2000 KVA
2 INSURANCE BUILDING 2000 KVA
1 BANK & TRUST BUILDING 1500 KVA
1000 KVA 13,200-480Y/277 TRANSFORMER
2000 KVA SECONDARY SELECTIVE UNIT SUBSTATION
1000 KVA 13,200-480Y/277 TRANSFORMER
ELEVATOR MOTORS
LIGHTING FEEDER RISER
LIGHTING PANELS
FIRE PUMP
LIGHTING PANELS
MOTOR CONTROL CENTER
TYPICAL LOAD CENTER UNIT SUBSTATION
UTILITY FEEDERS
13.8 KV METALCLAD SWITCHGEAR
7 RETAIL SHOPS 1500 KVA
8 OFFICE BLDG 2000 KVA
9 1000 ROOM HOTEL 2-4000 KVA
10 RESTAURANT & SHOPS 1500 KVA

FLEXIBLE, ECONOMICAL POWER distribution system for entire Park Project is contained in one-line diagram. Numbers key equipment to Project buildings. Completed Utility Building also uses General Electric 480Y/277-volt equipment.

serves power needs of "city within a city"

$125 million Exchange Park Project in Dallas shows how General Electric's "system approach" is key to flexible, economical commercial power distribution.

To keep pace with the Southwest's vigorous economic growth, a $125 million commercial center is rising on 120 acres four miles from downtown Dallas. Known as Exchange Park, this community represents one of the most advanced city-within-a-city developments yet attempted in the United States. It is scheduled for 1960 completion. Nine major buildings, parking for 15,000 cars, 40-foot-wide air conditioned malls, 150 retail shops, and other facilities will enable shoppers to take care of every personal and business need in scientific comfort. Already completed: Exchange Bank and Utility Building.

SELECTING THE BEST POWER DISTRIBUTION SYSTEM, to satisfy Exchange Park's heavy load concentration efficiently and economically, required thorough system analysis early in project planning. G-E engineers, working closely with Mr. George M. Bostock, Vice-president and Engineering Manager of Exchange Park and his consultants*, recommended a 480Y/277-volt secondary selective system as optimum. General Electric also provided basic system layout, service engineering and installation assistance at the site.

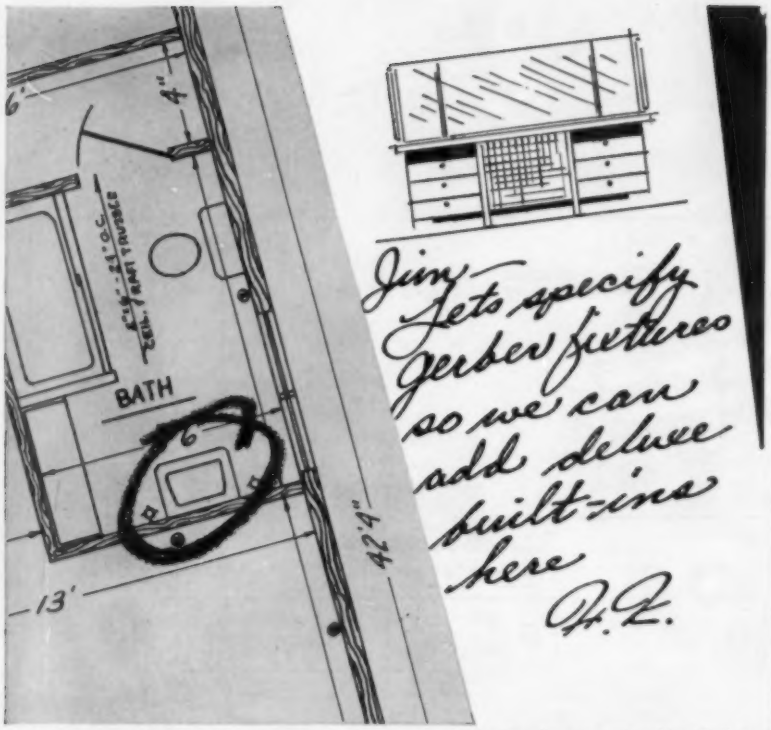
ADDED VALUES stem from adoption of G-E system recommendations. Exchange Park's 13.2 kv distribution system has capacity for load growth. Secondary selective system features permit reliable operation. Utilization of 480Y/277-volt system means fewer, less-metal circuits and substantial dollar savings. Using 480Y/277-volt equipment in only two of nine buildings, for example, saved $90,000.

GENERAL ELECTRIC SYSTEM ENGINEERING CAN HELP YOU on your construction project. Call on G-E engineers early in your planning when they can be of greatest value. Contact your nearest G-E Apparatus Sales Office or write General Electric Co., Section 680-12, Schenectady 5, N. Y.

*Architect: Lane, Gamble and Associates Consultants: Blum and Guerrero
Electrical Contractors: Fischbach and Moore; Superior Electric Co.

Engineered Electrical Systems for Commercial Buildings

GENERAL ELECTRIC



Sensibly priced Gerber Plumbing Fixtures give you full value for your plumbing dollar. You can install the smartest fixtures and bathroom "extras" too.

Add the "extras" that mean smarter bathroom designs...at no extra cost

You can design a more interesting bathroom without increasing costs when you specify Gerber Plumbing Fixtures. Here's why . . .

Gerber *prices* are so sensible that the money you save can be used to add those interesting architectural touches that give distinctive bathroom beauty.

Gerber *quality* equals that of the most expensive fixtures made, and earns the Good Housekeeping seal.

Gerber *styling* enhances your bathroom design. Gerber's complete line of brass, vitreous china ware, and steel enamel ware is smartly styled . . . easy to install. Gerber offers fixtures in 5 colors and white to fit most decorating schemes.

Why not see a Gerber representative before you specify plumbing fixtures for your next building or remodeling job?

Free Catalog *Write for catalog No.M-10.a 96-page catalog with specifications, photographs, and complete information on Gerber brass, vitreous china, and steel enamel ware.*

Guaranteed by Good Housekeeping

GERBER Plumbing Fixtures

Gerber Plumbing Fixtures Corp., 232 N. Clark St., Chicago 1, Ill.

5 Modern Plants: Kokomo, Ind.; Woodbridge, N. J.; Delphi, Ind.; Gadsden, Ala.; West Delphi, Ind.

Export Division: Gerber International Corp., 500 Green St., Woodbridge, N. J.

spokesmen

(Continued from page 244)

The size, proportions, and spacing of all such units have in many cases been standardized in units that are readily adapted to the modular dimensions of a building, as established by an architect. The structural steel industry is fully aware of the economies that can be achieved through multiple production of a component part in a structure.

MACE H. BELL
Chief of District Engineers
American Institute of Steel Construction, Inc.

The manufacturers of electrical equipment, as evidenced by the rather extensive standardization work carried on by them, have recognized the need for dimensional standardization aimed at interchangeability and adaptability to existing conditions. It is, therefore, a logical conclusion that these manufacturers, insofar as the particular and peculiar requirements will permit, will adapt their products to the dimensional modulars of the building construction industry, or will make them compatible therewith.

L. D. PRICE, Manager
Engineering and Safety Regulations Dept.
National Electrical Manufacturers Association

Designing to modular components rather than pieces and small parts is undoubtedly one of the dominant new trends in construction. Because plywood lends itself so well to this approach, our industry is particularly interested and we are exploring the matter seriously right now. . . . This offers an entirely new field to the designer and entirely new sets of problems which should result in newer solutions. However, industry must set the pace by indicating what can be done with components in all types of construction design. At the same time the design of potential components themselves need to reflect imagination, flexibility, ease of handling, and low cost if they are to be at all useful. . . . The emergence of low-cost, flexible components and modular parts could once more set us on the right road to real progress—more and more for less and less.

W. E. DIFFORD, Managing Director
Douglas Fir Plywood Association

Most of the recent developments in air-conditioning systems and components have been built around, and lend themselves to, modular architecture. Some of these include high-velocity air systems, both single and dual duct, high-velocity diffusers and high-velocity induction units; chilled water under-window fan coil units; electric-motor or turbine-driven centrifugal compressor water chilling units; steam or gas-heated absorption-type water-chilling units; packaged heat pumps, and many others. . . . The forward-looking members of our industry are today producing a standardized and standard-sized units of equipment which should make the problems of planning, specification, and installa-

(Continued on page 252)

Small office buildings have the same need for efficiency as large ones. They, too, must keep pace with the increasing use of electronics in modern business. When you build with Robertson Q-Floor (the original cellular steel sub-floor) the structural floor of your building will be a continuous series of easily accessible ducts for the passage of wires for every conceivable kind of service for today's needs and the future's. In a matter of minutes, you will be able to move or add communications or power outlets to any required location over the entire floor surface . . . quickly, inexpensively and cleanly. You will be able to move partitions and furniture at will with no worry about the distance to the nearest electrical and telephone outlets. They will be there! It pays to keep in mind that even though you may not need a building as big as the Prudential Building in Chicago, or the U. S. Steel-Mellon Bank Building in Pittsburgh, or the Lever House in New York, you will want the modern efficiency that Q-Floor brings to them. Use the coupon to write for literature.

With 150 trained sales engineers and 60 qualified service dealers, Robertson is ready to serve you in any part of the country. You will always have the best of technical assistance when Robertson products are specified.

Today's finest buildings are built with **Robertson**

Q-Floor

The STANDARD sub-floor construction for modern buildings

H. H. Robertson Company

2405 Farmers Bank Building, Pittsburgh 22, Pa.

In England—Robertson Thain Ltd., Ellesmere, Cheshire

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Please send 44-page Q-Floor Manual.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

TROFFER
CURVED
ALBA-LITE
PANELS
CORNING

Put all the facts about lighting glassware at your fingertips

These 11 product bulletins from Corning make your files complete

What kind of lighting glassware to use . . . *where* . . . and *why*—are spelled out for you.

You'll have these facts at your fingertips when you get these product information bulletins from Corning. Data sheets give you physical characteristics, calculations, photometric tables and charts.

The "Commercial Lighting Application Guide" summarizes types of glassware available, suggests and illustrates where and why each type is most efficient.

Be set to discuss and specify engineered lighting glassware for *every kind of job*. Send for the items you need, today.

New sample kit contains nine glass samples, indexed for ready reference with product information cards attached. Ask the Corning man to show it to you.

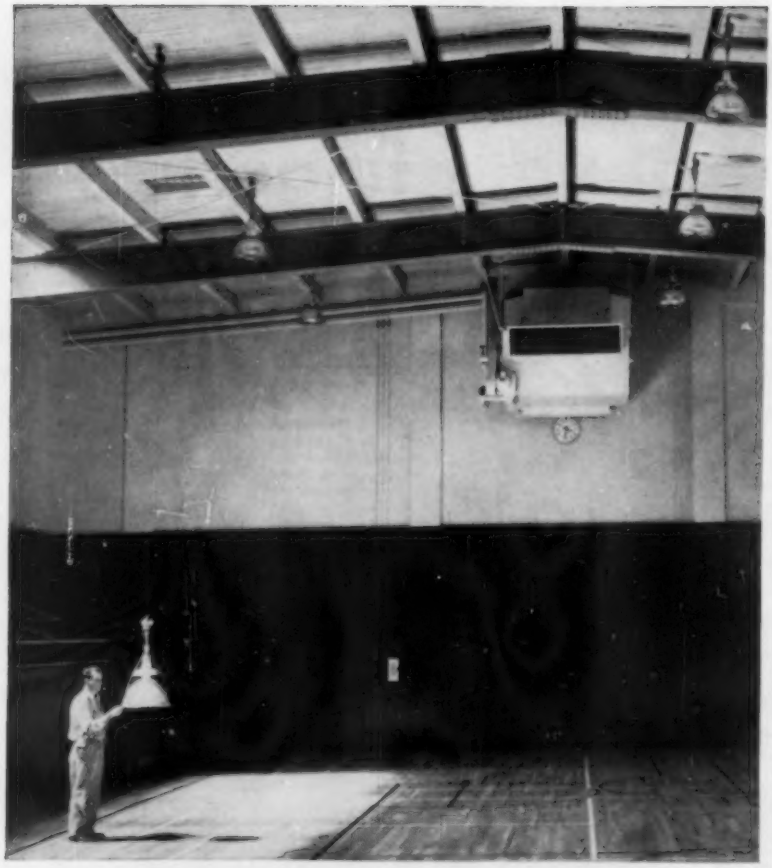
CORNING GLASS WORKS 63-11 Crystal Street, Corning, N.Y.

Please send me the following material: "Commercial Lighting Application Guide" ☐; "Engineered Lighting Glassware" ☐; "Pattern No. 70 Low Brightness Lens Panel" ☐; Low Brightness Curved Lens Panel ☐; "Pattern No. 83 Crysta-Lite for 12" and 24" toffers" ☐; "Alba-Lite in Flat Panels" ☐; "Toffer Curved Alba-Lite Panels" ☐; "Twinlite Lens Panels" ☐; "Fota-Lite" ☐; "Square Concave Lenslites" ☐; "Corning Tempered Lenslites" ☐.

Name.....
Title.....
Company.....
Street.....
City.....
Zone..... State.....

Corning means research in Glass

CORNING GLASS WORKS 63-11 Crystal Street, Corning, N.Y.



UNLESS YOUR MAINTENANCE MEN ARE 30 FEET TALL . . . YOU NEED THOMPSON HANGERS!

It's no secret! Servicing *fixed position* high-bay luminaires is difficult, hazardous and costly. Relamping one fixture mounted 20 feet or more above the floor normally involves erecting scaffolds or ladders . . . two or three men . . . about one hour's time. And because the fixture is "hot", one man must be a skilled electrician.

BUT . . . when high-bay lights are equipped with THOMPSON HANGERS, the job is fast, safe, easy. One unskilled man can relamp and clean a light . . . whenever necessary . . . in an average of 5 minutes! All work is accomplished at floor level with a "dead" fixture. No climbing hazards, electrical dangers or assistance are necessary for fast efficient servicing.

No matter how you figure it, if you want long range economy and peak lighting efficiency . . . THOMPSON HANGERS are your best buy.

FOR DETAILS, WRITE TODAY FOR BROCHURE TH-57.

T-E

THE THOMPSON ELECTRIC COMPANY
P. O. Box 873-H · CLEVELAND 22, OHIO

7520-TE

spokesmen

(Continued from page 248)

tion less difficult—and less costly.

GEO. S. JONES, JR., Managing Director
Air-Conditioning and Refrigeration Institute

The steel industry was undoubtedly one of the first in this country to give recognition to the value of standardized and MODULAR structural ASSEMBLY. One early example was the standardization of corrugated roofing and siding sheets. . . . Other more recent examples of the use of modular design and assembly have been the fabrication of steel window, door, roof, floor, curtain wall, partition, and stairway assemblies to conform to the standard 4-in. module. Structural-steel framing, of course, has long been manufactured in a sufficient number of sizes to permit the use of modular design by the architect and engineer. . . . Building codes have been greatly improved during the past four years . . . such modern codes as the Basic Building Code, the National Building Code, the Southern Standard Building Code, and the Uniform Building Code would not limit the use of modular design or assembly. There are still, of course, a few exceptions to the rule.

W. G. KIRKLAND, Chief
Engineering Division
American Iron and Steel Institute

The Sliding Glass Door and Window Institute already is moving in the direction of MODULAR ASSEMBLY design. Major steps toward this were achieved about two years ago when the Institute consolidated hundreds of nonstandard sizes into a far smaller number of standard door sizes. . . . This step was further advanced when the glass industry, working with the Institute, added standard sizes of dual-insulating glass. . . . It is difficult to establish over-all modular dimensions for sliding glass doors, (but) MODULAR ASSEMBLY is, of course, a desirable subject to tackle.

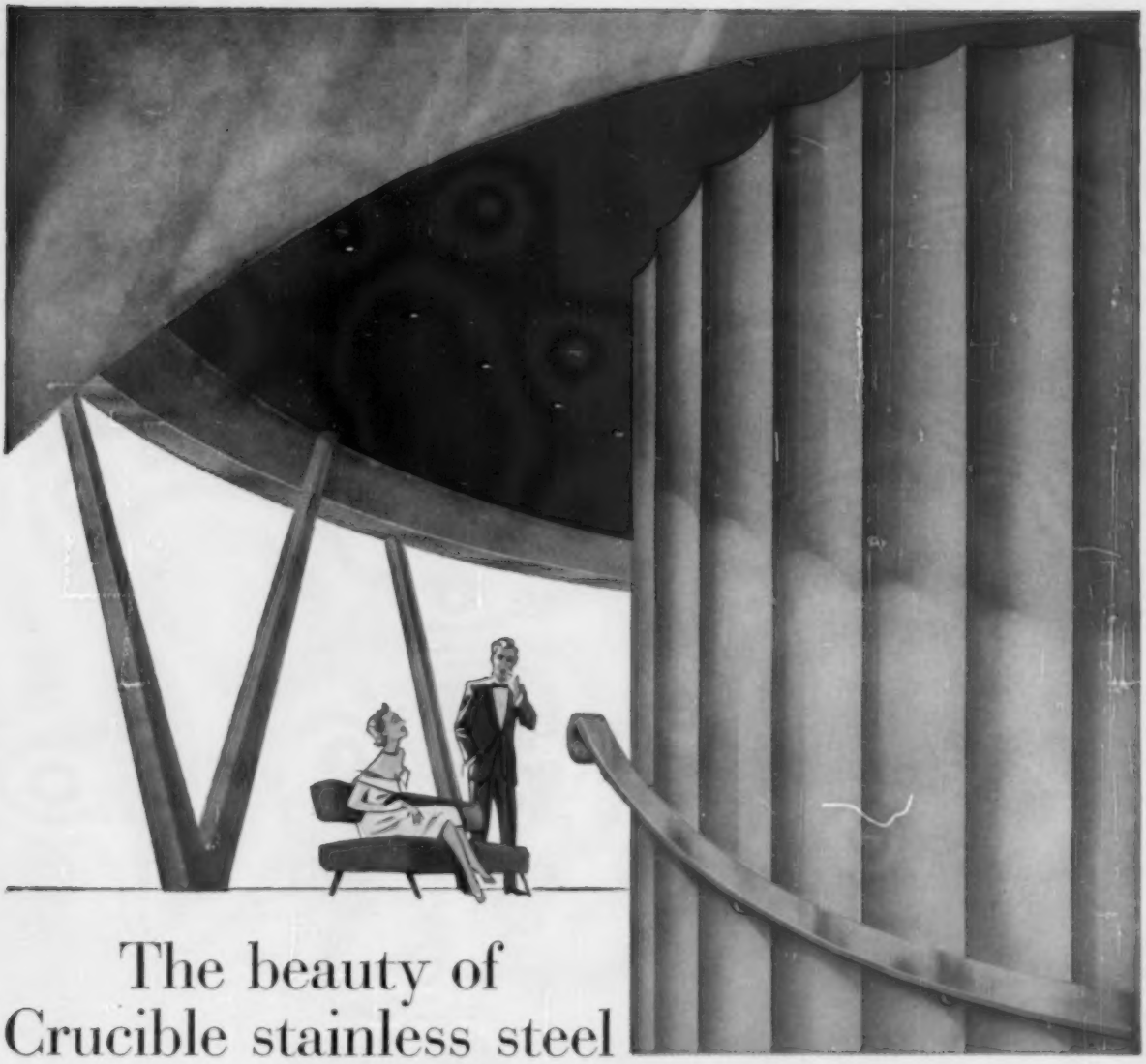
FRANK B. MILLER, President
Frank B. Miller Mfg. Co.
President
Sliding Glass Door and Window Institute

We are, of course, not in a position to comment on the future of *architecture* with respect to MODULAR ASSEMBLY, but it is our opinion that the use of modular design and standards will permit economies in the *actual construction operations* so that the public will receive its building facilities, as executed by the contractor, at a lesser cost than otherwise would prevail.

WELTON A. SNOW, Manager
Building Division
Associated General Contractors of America, Inc.

The home builder, as the co-ordinator of unrelated parts and pieces that must be put together to build a house, especially appreciates the value of modular dimensioning and modular construction. The home-building industry is moving strongly in the direction of component construction . . . the component parts

(Continued on page 256)



The beauty of Crucible stainless steel ... it highlights your design

What are the advantages of specifying stainless steel? One advantage is that it is both beautiful and functional. You can use it to build and enhance a skyscraper or a store-front—without introducing new construction problems. And, in either case, its natural dignity and lustre highlight your design.

Then, too, clients quickly approve specifications for stainless steel. They know it gives lifetime service—maximum resistance to corrosion and weathering. They also know it requires very little maintenance; for example, periodic cleaning as required with other metals is not necessary with stainless steel.

There are hundreds of uses for stainless steel in both the interiors and exteriors of residences, industrial and commercial buildings, no matter what their size. Like to know more about them? Send today for "A Guide to Future Uses of Stainless Steel in Architecture and Building", a free 20-page booklet prepared by one of America's largest makers of stainless steel sheet and strip. Write: *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

Canadian Distributor—Railway & Power Engineering Corp., Ltd.

Sheraton Hotel, Philadelphia
Architects: Perry, Shaw, Hepburn & Dean
Engineers: Slocum & Fuller
Mechanical Contractors: Ambrose-Augusterfer Corporation
Builders: McCloskey & Company
Owners: The Sheraton Corporation

The right atmosphere calls for quality air conditioning "custom" controlled

THE RIGHT atmosphere is a matter of immediate concern to businessmen, whether in a modern office building, factory or store—or in a hotel—such as the superb new Philadelphia Sheraton.

Prime requirement is quality air conditioning that provides year-round comfort, better health and efficiency of employees, improved customer good will.

Such an air conditioning system includes precision heating, ventilating and cooling—all under coordinated control. The best way to provide such a control is with a Honeywell *customized* installation designed to fit the specific needs of the building.

The new Sheraton is an outstanding example. In dining rooms and other public spaces, the Honeywell customized installation automatically keeps temperature and ventilation at proper comfort levels regardless of occupancy and the weather outdoors. In each guest room a Honeywell thermostat allows individual choice of temperature.

When you plan air conditioning, do it right. Specify Honeywell customized control. For *only* Honeywell makes all three types of controls—pneumatic, electric and electronic—and therefore can impartially select the most efficient system for your building.

To learn more about customized control, call your local Honeywell office. Or, write Minneapolis-Honeywell, Dept. PA-11-259, Minneapolis 8, Minnesota.

Right atmosphere, twenty-four hours a day, is provided in the new Philadelphia Sheraton by quality air conditioning, custom controlled. In every room as in the suite shown here, a Honeywell thermostat permits guests to adjust room temperature to their own comfort level.

The Honeywell Round . . .
World's Most Popular Thermostat

Guests always feel comfortable in this new Sheraton Hotel main dining salon. As in ballrooms, lobbies and other spaces of the Hotel, Honeywell controls automatically adjust heating, cooling and ventilation to the occupancy factor, no matter how quickly it changes.

Honeywell

H HONEYWELL First in Controls

In Your Constant Search for LOWER COSTS

Are You Overlooking DOORS?

Whether seldom used or in constant action, doors can affect other plant costs in ways that may escape management's closest scrutiny.

For example, note these cost-cutting features of the door with the interlocking steel slats *(originated by Kinnear)*.

They coil above the opening! Whether opened, closed, or in action, Kinnear Rolling Doors waste no usable space anywhere.

They clear the entire doorway! When open, Kinnear Rolling Doors stay out of the way, out of reach of damage by wind or vehicles.

They save time and labor! Kinnear's coiling upward action, the key to highest operating efficiency, is also ideal for *motorized* door convenience — with push-button operation, remote switches, and other controls that meet today's trend to complete automation.

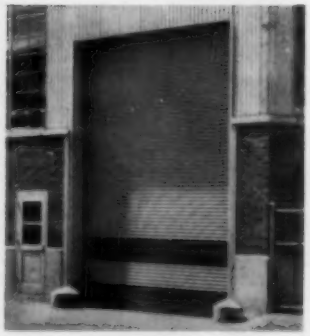
They cut heating, cooling costs. Kinnear Rolling Doors *(especially when motor operated)* promote prompt closing that cuts loss of heat in winter and cooled air in summer.

They give extra protection. Kinnear's all-metal curtain assures added protection against fire, wind, weather, vandalism.

They last longer! Records show that many Kinnear Doors have been in continuous daily use *40 years or more*.

Extra-heavy galvanizing! 1.25 ounces of pure zinc per square foot of metal, ASTM Standards, give the Kinnear curtain highest resistance to corrosion.

Built to fit any opening, with motor or manual control, Kinnear Rolling Doors assure the right answer to your needs. Write today for details!



Be sure to get the facts on

Kinnear STEEL Rolling Doors

KINNEAR ROLLING DOORS
Saving Ways in Doorways

The KINNEAR Mfg. Co. *Offices and Agents in All Principal Cities*

Factories: 1540-60 Fields Ave., Columbus 16, Ohio; 1742 Yosemite Ave., San Francisco 24, Calif.

spokesmen

(Continued from page 252)

must be so dimensioned as to provide design flexibility and when used in conjunction with each other provide dimensions that are meaningful in house design. In our own NAHB Research Institute Home of the Year project, we used modular dimensioning and construction throughout. . . . Certainly modular co-ordinated component construction offers new opportunities in home building.

RALPH J. JOHNSON, Director
Construction Department and Research Institute
National Association of Home Builders

Lumber is one of the few materials which lends itself equally well to "modular" and "custom" construction. Its versatility and adaptability have been demonstrated in every architectural style in America since the introduction of the log cabin, and its contribution to the MODULAR ASSEMBLY system may be expected to be of similar importance.

H. V. SIMPSON
Executive Vice-President
West Coast Lumbermen's Association

From the standpoint of a manufacturer we can report that standardization of sizes and Modular dimensioning is efficient and advantageous to us. We are convinced that "on the job" construction permits the architect and the builder to better express himself in distinguished and distinctive buildings to conform to the desires of the owner and his client as compared with the artificially constricted requirements of factory-built residences and structures. The use of MODULAR ASSEMBLY incorporating materials of Modular Co-ordination will achieve expression of the individual taste of the clients and at the same time effect the economies necessary to meet the modern requirements for housing of individuals and institutions. We hope that the day will not be long coming when standardization can be achieved in units of Modular Measure exclusively used.

NEILL BOLDRICK, Vice-President
General Sales Department
Acme Brick Company

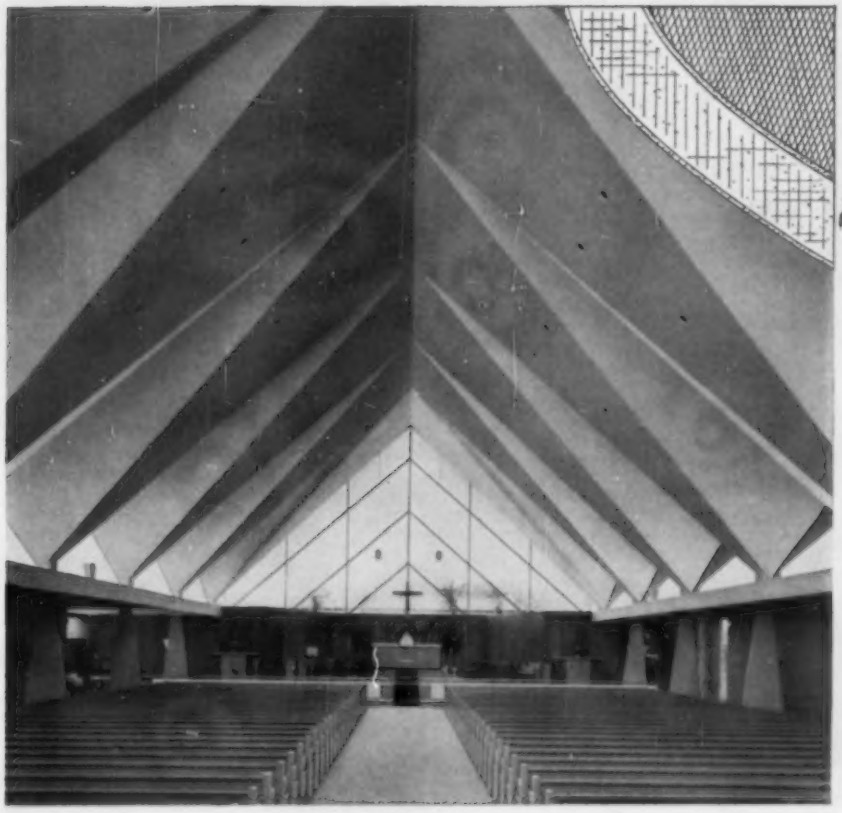
In one sense, the majority of producers of building materials have had to drag their feet on the MODULAR ASSEMBLY movement. We supply our materials in the sizes and shapes our customers, the architects, demand. On the brighter side, however, we also provide the momentum which sustains the movement by offering a break in price on those items we can mass-produce to predetermined sizes.

JOHN E. SHACKELFORD, Director
Market Research and Product Promotion
Marble Institute of America, Inc.

MODULAR ASSEMBLY should be the basic objective of all interests connected with the building industry. In its broad meaning the warm-air heating and air-conditioning industry is prepared to lend its support. Our manuals and forms . . . the accepted standard by various gov-

(Continued on page 260)

Design versatility with Gold Bond SPRAYOLITE



Cutaway shows Sprayolite applied to a basecoat of extra fibered plaster. The 3.4 Diamond Metal Lath is supported by 1½" channel iron. All building materials shown are by Gold Bond.

Immaculate Conception Church, Marrero, La. — *Architect:* Curtis & Davis, New Orleans, La. *General Contractor:* Gervais F. Favrot Co., Inc., New Orleans, La. *Plastering Contractor:* Sam Bird, Metairie, La.

Spray-on acoustical plaster proves itself in contemporary Louisiana church

A reverent atmosphere for worship is created by a combination of many design elements including beauty, quiet and the utilization of natural light. Gold Bond Superwhite Acoustical Plaster helps to achieve this goal by permitting complete freedom of ceiling design. Sprayolite follows the most intricate contours ... dries to uniform color and texture ... even with starting and stopping during application.

Sprayolite has exceptional bonding qualities, drying rather than setting, to form a porous, sound-deadening surface with a .55 NRC rating. Its super-white color provides an unusually high light reflectance rating of 69%, so important in using natural light to the fullest.

Specify Gold Bond® Sprayolite ... the acoustical plaster that sets no limits to your ceiling design. Consult Sweet's catalog, Section 12d/Na, or write National Gypsum Co., Dept. PA-117, Buffalo 2, N.Y.

SPRAYOLITE ACOUSTICAL PLASTER

NATIONAL GYPSUM COMPANY

Gold Bond
BUILDING PRODUCTS

Mr. Groom (left) discussing concealed wiring installation with Edward A. Smith of The Pacific Telephone & Telegraph Company

"Concealed telephone wiring is a profitable investment for builders"

— says Glen L. Groom, Builder, of Chabot Park, Oakland, Cal.

"I build houses by the dozens," says Mr. Groom, "as many another builder does. Sometimes I have as many as a hundred going up at once. And in every one I invest in concealed telephone wiring just as I invest in concealed electrical wiring and other built-in facilities that modern home-buyers look for and want.

"Concealed telephone wiring is a profitable investment for me. It's a salable item itself but, more important, it helps me sell my homes because it means added convenience, and preserves the finished beauty of the rooms. In a business where you're constantly trying to second-guess Mrs. Smith and Mrs. Jones, concealed telephone wiring is a helpful sales feature."

Your nearest Bell Telephone business office will help you with concealed wiring plans. For details on home telephone wiring, see Sweet's Light Construction File, 8i/Be. For commercial installations, Sweet's Architectural File, 32a/Be.

Working together to bring people together
BELL TELEPHONE SYSTEM

Gold Bond Acoustimetal gives your clients LONG-RUN ACOUSTICAL CEILING ECONOMY

C. P. Clare & Co., Chicago, Ill.

Your client's first cost will be the *least cost in the long-run* —when you specify Gold Bond Acoustimetal Ceilings for such in-plant installations as this one. The reason? Low maintenance over a longer life.

This award-winning C. P. Clare & Co. plant was designed for permanence and for efficiency. The Acoustimetal ceilings here will serve this company for the life of the building by increasing production, reducing employee fatigue and keeping maintenance costs low.

Acoustimetal *wipes clean* with a soapy sponge—it needn't be repainted. Just *one* eliminated paint job could save C. P. Clare the moderate extra price they paid for Acoustimetal.

Employees are assembling intricate electrical relays in the photograph above. Noise interferes with accurate work like this—Acoustimetal's incombustible mineral wool pads absorb from 80% to 90% of all noises that strike them. Acoustimetal's baked white enamel surface provides light reflectance in the .70-.73 range.

There is a Gold Bond Acoustical Ceiling designed for every type of ceiling you plan...for every building you design. For further information on all these acoustical ceilings, call your Gold Bond® Acoustical Contractor—he's listed in the "Yellow Pages." Or write Dept. PA-117, National Gypsum Company, Buffalo 2, New York.

ACOUSTICAL CEILINGS

NATIONAL GYPSUM COMPANY

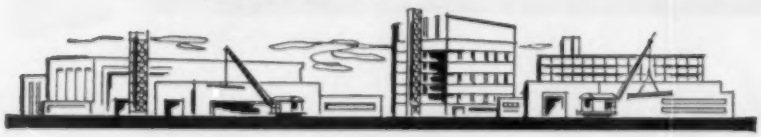
Gold Bond
BUILDING PRODUCTS

when
intercom
becomes
a part
of your
planning

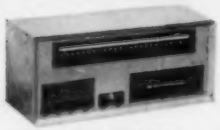
call the man
from
Webster

. . . no one knows intercommunications better or can help you more! Take advantage of his specialized knowledge of Teletalk application and installation — plus a complete familiarity with local codes and regulations. No obligation, of course.

ELECTRONICS DIVISION
WEBSTER ELECTRIC
RACINE · WIS



TELETALK
2000-3000 series
Newest interpretation of the finest in intercom systems. Two handsome models. New transistors, printed circuits, Telebar control. 6 to 60 stations.



WEBSTER CONSOLETTE
Ideal hub of communications for hospitals, schools, churches, factories, clubs. Dual channel operation — permits intercommunication, with music distribution, paging at one time.

TELETALK
A 1000 series
Low cost intercom for small business, stores, offices, farms, for the home — wherever ten or fewer stations will serve. Ample power, excellent fidelity.

I want to know all about Teletalk:
☐ *have the man from Webster contact us.*
please send the following:
☐ *Complete Teletalk Intercom Catalog.*
☐ *New Information or Data as published.*

Name _____
Title _____
Company _____
Address _____
City _____ State _____

M-108

spokesmen

(Continued from page 254)

ernment agencies . . . contain the requirements for modular construction.

GEORGE BOEDDNER, Managing Director
National Warm Air Heating and
Air-Conditioning Association

The subject of MODULAR ASSEMBLY has been given a great deal of study and consideration by our officers, and special committees, as well as the general membership. By self definition, the members of this Institute manufacture complete assemblies of millwork and cabinetwork, including windows, for individual building contracts, in accordance with the design specifications of architects and designers. . . . We constantly remind the design professionals that exterior finish fabricated from the world's most flexible building material can be readily adapted to any system of Modular Measure or proportional modules.

JOHN L. ROSE, Executive Secretary
Architectural Woodwork Institute

notices

new partners, associates

CHARLES O. MATCHAM announces the reorganization of his firm to be known as CHARLES O. MATCHAM, STEWART S. GRANGER & ASSOCIATES. Associates in the firm will be IRA TRON and EDLA MUIR.

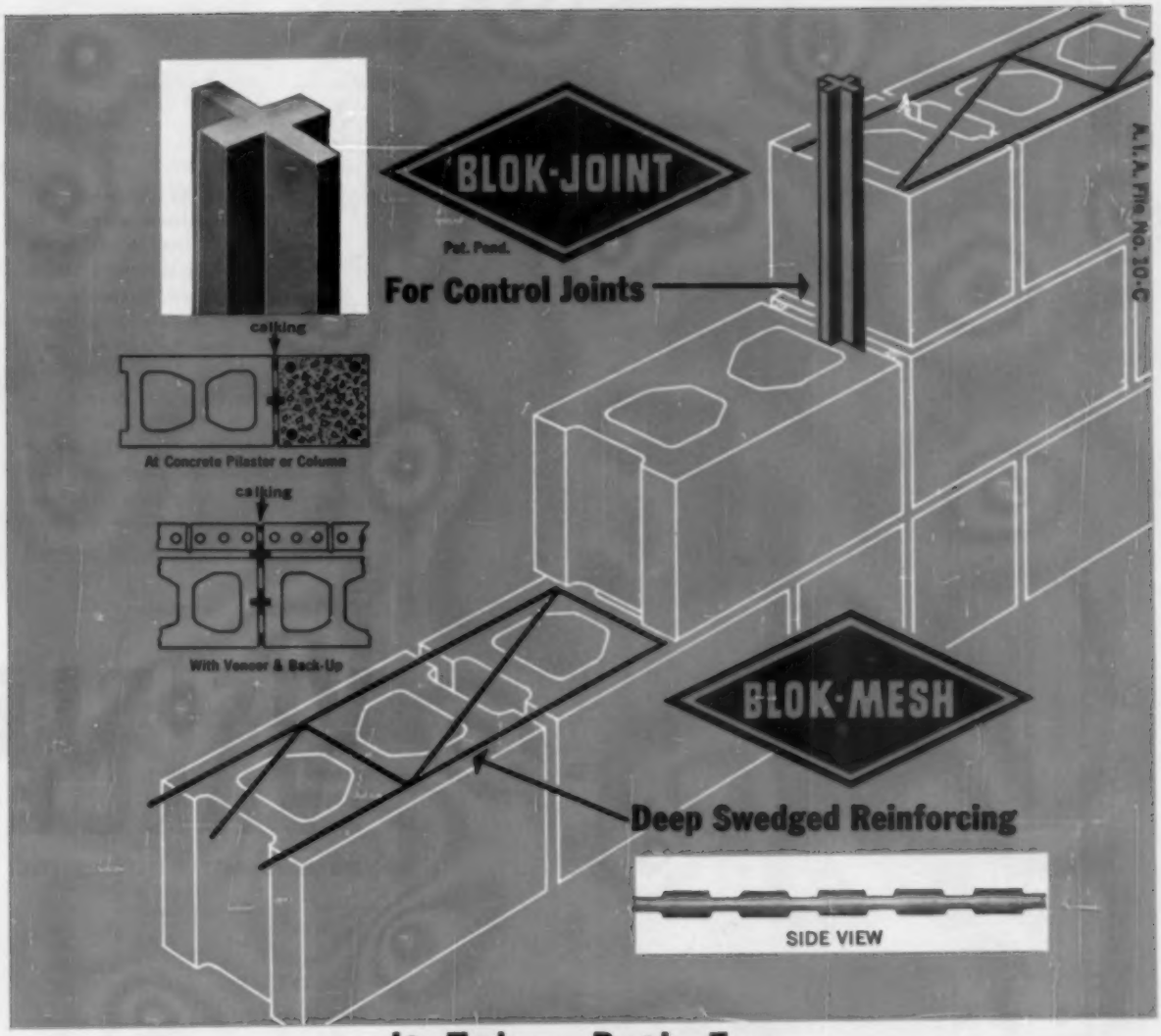
GEORGE FOSTER HARRELL and E. G. HAMILTON announce their association. Firm will be known as HARRELL & HAMILTON, Architects, Republic Bank Building, Dallas, Tex.

H. E. BOVAY, Jr., Consulting Engineers, Houston, Tex., announce merger with Reg F. Taylor, Consulting Engineer. BOVAY firm name will be retained.

ROBERT BURNS, DANFORTH W. TOAN, and FRITHJOF M. LUNDE have joined CHARLES H. WARNER, JR., as partners Firm will be known as WARNER, BURNS, TOAN, LUNDE, Architects, 414 Madison Ave., New York, N. Y.

WILLIAM N. PAULEY, has become a partner in firm of H. E. BOVAY, JR., Consulting Engineers, 5009 Caroline St., Houston, Tex.

KEN WHITE ASSOCIATES, Industrial Designers, P. O. Box 209, Westwood, N. J., announces JOSEPH BOWDEN has joined the firm's design staff.



It Takes Both For
MORE STRENGTH & PROTECTION IN MASONRY WALLS

Blok-Joint is a cross-shaped rubber extrusion used to make control joints in masonry walls. No special blocks are required—no building paper and mortar fill is necessary. No cutting or sawing to be done. Blok-Joint is used with any standard metal window sash block.

The secure interlock provided by Blok-Joint adds to the lateral stability of the wall. It allows for contraction *and* expansion while maintaining a firm joint.

Blok-Joint is effective in single block walls, with brick and block backup and at pilasters and columns.

The big advantage you get with Blok-Mesh is the exclusive "Deep-Grip" swedging. It allows the mortar to get a real bite on the reinforcing yet requires no more area in joint than other types of superficial deforming.

Blok-Mesh is designed to eliminate cracks above lintels and below sills. It minimizes ordinary shrinkage cracks. Notice in the illustration how the "Deep-Grip" swedging of Blok-Mesh is large, deep and well-defined to form effective dovetailing.

For Further Information

Write for FREE Blok-Joint sample

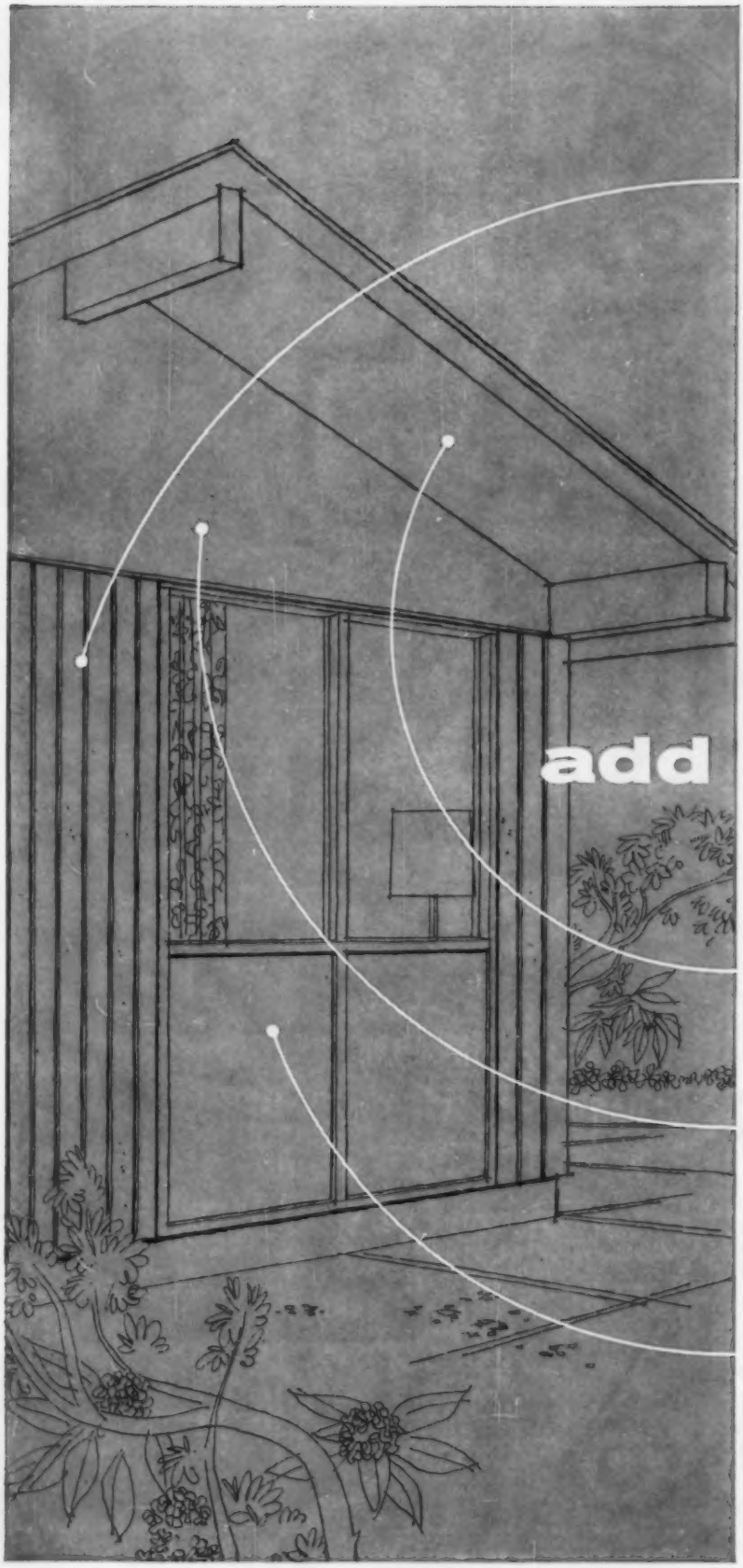
and literature on Carter-Waters 2-point better masonry wall design.

For Further Information See

2-c
Car
Architectural or Industrial Construction File

CARTER-WATERS

2440 Pennway, Dept. PA, Kansas City, Mo.



Siding

Fir plywood siding makes sense in today's competitive market. It goes up from a third to half again faster than other materials. Saves on time and labor. It can be applied directly to studding, completely eliminating sheathing costs. It's good looking, too. Exterior plywood siding gives your homes real sales appeal. And because it has design flexibility, and comes in smooth or textured panels, you can use plywood many ways on houses in the same development and still avoid that "peas in a pod" look.

VISIBLE VALUE

Soffits

Smooth, flat Exterior plywood soffits present attractive flush surface, unmarred by detracting cracks and joints.

Gable Ends

Smooth or textured Exterior plywood gable ends are good to look at. Because your men work with a few big sheets rather than cutting and fitting many smaller pieces, big plywood panels mean a net saving in construction costs.

Accent Panels

Use brightly painted smooth or textured plywood panels to provide striking contrast with basic siding. Ideal for "panelized" effects around windows, doors, etc.

Texture One-Eleven® Exterior plywood has pleasing vertical shadow-line pattern created by deep parallel grooves. Slightly rough surface texture is enhanced by weathering.

"*Board and Batten*" siding is easily achieved by applying Exterior fir plywood vertically and covering with moldings.

Wide-lapped siding made by ripping panels in half or thirds has unusual "scale." Use standard PlyShield grade or, for smoother, more durable paint finishes, overlaid plywood.

with Exterior Fir Plywood

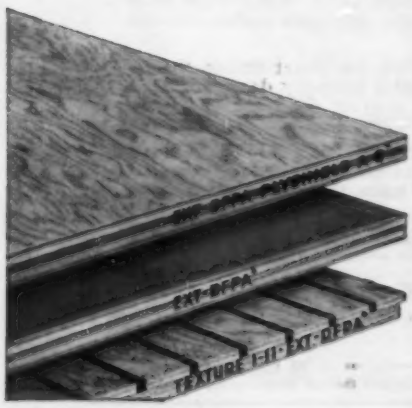
all around the house, fir plywood helps you build better at lower cost

Use Exterior fir plywood for single wall carport construction. Panels add bracing strength.

Exterior plywood outdoor storage units make up for lack of storage in homes without garages.

Exterior plywood patio fences are real assets in selling outdoor-living-conscious prospects.

Use fir plywood for secondary buildings like this smart pool-side cabana, outdoor living rooms, etc.



For all outdoor construction, specify *EXT-DFPA® Exterior Plywood:*
1. Standard *PlyShield®* grade for soffits, gable ends, low-cost siding;
2. *Overlaid Exterior Plywood* (fused resin-fiber surfaces) for finest paint base, check-free finishes; 3. *Texture One-Eleven®* "grooved" panels.

Write for free PLYWOOD CONSTRUCTION PORTFOLIO,
(USA only) Douglas Fir Plywood Association, Tacoma 2, Washington

DFPA TESTED QUALITY

Fir Plywood

means quality construction

DESIGN without barriers

A.I.A. FILE 3F1

bell tower
Faith Lutheran Church
Bridgeport, Michigan
Glen Beach, architect

Since 1946, Whitacre-Greer has been developing and perfecting a system of brickwork that meets the requirements of modular co-ordination while providing the flexibility of materials so necessary in today's construction.

This system involves the use of three or more different lengths of brick in a wall. 18" brick are used with 12" and 8" brick in random bond. The result is complete freedom from vertical joint pattern. Modular vertical detailing is permitted with absolute dimensional freedom horizontally.

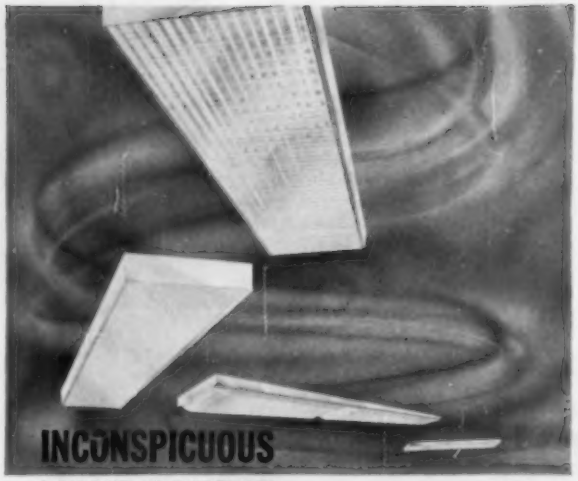
Costs? No greater than those for conventional grey standard or modular 8" face brick.

Whitacre-Greer has prepared a study outlining this new brickwork concept in detail. A copy is yours for the asking.

W | G

ladle brick, hot tops, 8", 12", 18" grey & pink face brick

THE WHITACRE-GREER FIREPROOFING COMPANY, WAYNESBURG, OHIO.



LIGHT SOURCE

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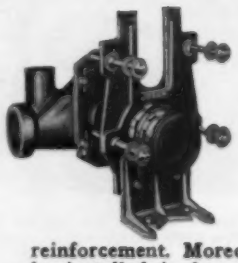

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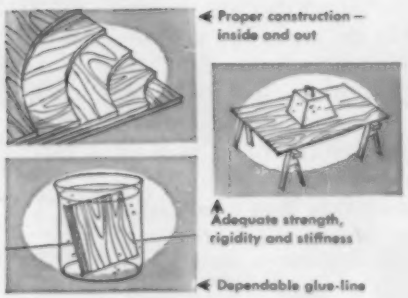

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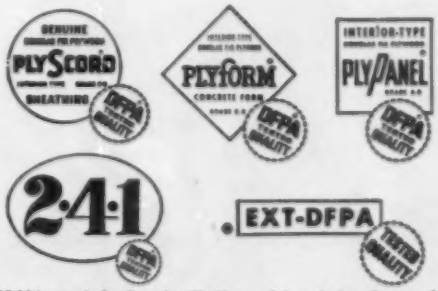

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architects' views on Modular-Measure dimensioning

(Continued from page 172)

The following quotations have been selected by Demarest from letters received in response to his questionnaire requesting comments on the "eight claims for Modular Measure." B.H.H.

fewer drafting errors

Use of Modular Measure results in fewer drafting errors. More men can work on a job together during different phases, with greater coordination, and fewer mistakes. This, in our opinion, is reason enough for adopting the system.

HILLS, GILBERTSON & HAYES, Architects

The part of the Modular system which we have found of distinct advantage is the use of "nominal" dimensions. This eliminates fractions, thus reducing errors in dimensioning.

CLAIR W. DITCHY, Architect

With Modular Measure, working with round numbers is easier and checking between draftsmen produces fewer errors. Assumed, of course, is that all men are properly schooled in the use of the method—which is not entirely a realistic condition. In checking shop drawings, it is a problem to determine what reference point is being used in shop-drawing submittals—an actual or a grid location. Most usually, shop drawings indicate no use of it.

SARGENT, WEBSTER, CRENSHAW & FOLLEY, Architects

fosters clearer detailing

Modular Measure in design definitely fosters clearer detailing. Many architects, unfortunately, still feel that it produces more work for the drafting room, rather than less. This is because the method forces logical thinking and a consciousness of the interrelationship of the parts which are often hazily detailed, and, in effect, at times studiously avoided on the drawings in the hope that somehow the contractor will work them out. It is my belief that it is better to spend the time solving such problems thoroughly in advance, than having to waste time later in arguments on the job over botched work.

A. GORDON LORIMER, Architect

It becomes unnecessary to clutter details with a lot of dimensions automatically covered by the Modular system.

WATERMAN, FUGE & ASSOCIATES, INC., Architects

Detailing is clearer—if you look at the entire problem, rather than a minor detail. Full-size details explain all discrepancies.

FAULKNER, KINGSBURY & STENHOUSE, Architects

We can think of conditions where the details were less clear—the outside gridline in plan was 3/16" outside the face of the brick. The majority of details, which require time to make clear, have little relation to the system — miscellaneous metal and flashings, for example.

We don't want to appear to be negative on this subject. We are aware of the possible advantages of systematic drafting and constructions methods, of the fact that efficiency and time-saving in doing anything come with repetition and experience, and that—if all manufacturers co-operated in producing for the system—there would be no limits to materials selection. On the other hand, we have two large projects in the design stage on which Modular Measure would complicate, rather than simplify, our work. It seems in general that our jobs are usually in this category.

(name withheld)

working drawings quicker

All of our engineering departments enjoy the advantages of Modular Measure, but our structural department has gained the most. In a modular-planned building, one automatically gets a simple and orderly framing plan, which reduces the time it takes to engineer and detail the project.

As closely as we can estimate, our drafting costs are 10 percent less than when we used the old-fashioned system. We think the reason our working drawings are costing less is that they are done in less time. Our chief draftsman believes that, if more materials were made on a Modular basis, it would reduce our drafting costs even further. One example he pointed out was the so-called standard door, which is normally seven-ft high. If this standard door height were increased or decreased two in., it would course out with any Modular masonry units now on the market.

MAGNEY, TUSLER & SETTER, Architects

I don't hesitate to set up nonstock widths for windows; the sill treatment can always accommodate the height. Generally, I use nonstock heights for flush wood-core doors, so coursing can be maintained with a two in. metal buck. Modular drafting is decidedly faster, certainly less costly. It has been my experience that different draftsmen can work on separate details simultaneously, with greater assurance that no drawing is likely to interfere with any other drawing.

JOSEPH W. WELLS, Architect

This office has just completed working drawings for a $1,000,000 school, dormitory, and service building project which is in the field for bids at the present time. This is our first attempt at the use of Modular Measure. A general educational campaign had been instituted in the office to acquaint the designers and draftsmen with the rules and regulations for the use of the system. The following specific comments have been made by the crew chief of this office on this particular project:

"The structural engineer refused to compromise column sizes to work Modular. This increased the amount of dimensioning between architectural and structural elements and complicated the scale-detailing of the project. It was the consensus of opinion in this office that production

(Continued on page 270)

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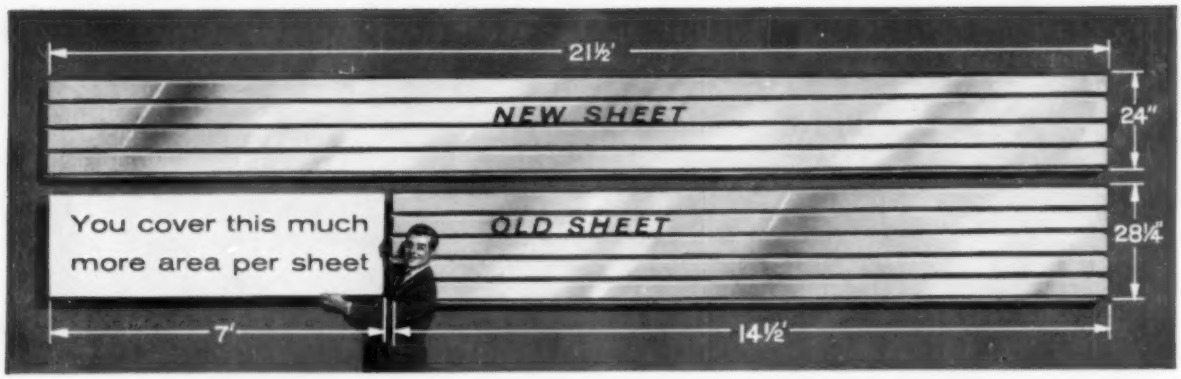

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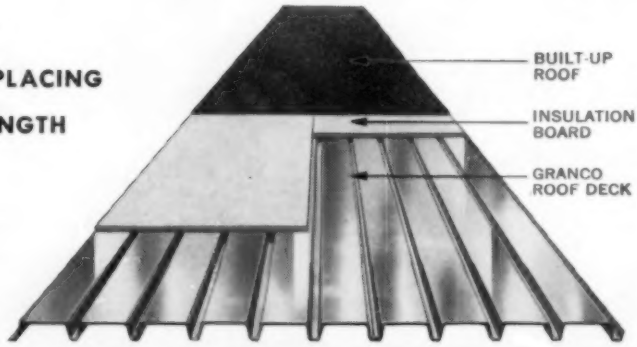

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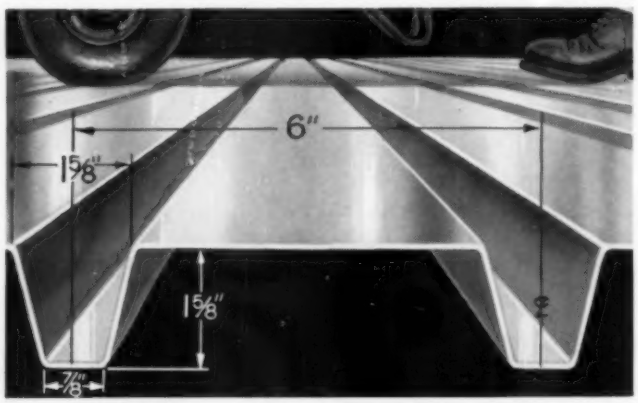

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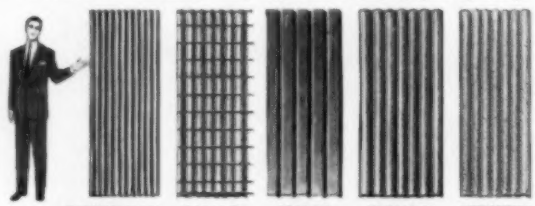

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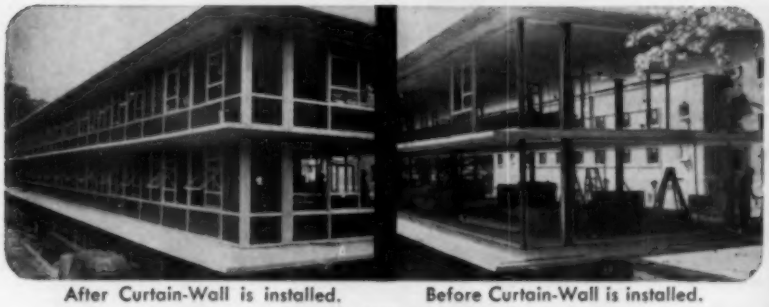

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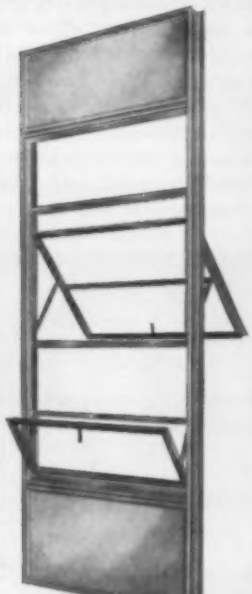

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modular measure

(Continued from page 266)

of working drawings was slowed by the double dimensioning, and was a source of irritation to the draftsmen who were unfamiliar with the system. We feel that it would be necessary for the engineer to co-operate 100 percent with the architect to make the Modular system work efficiently."

This office is abandoning the attempt to convert to Modular Measure and all future projects, at least for the time being, will be dimensioned on the working drawings in the normal method.

MARCEL BOULICAULT, Architect

useful in co-ordinating

Modular masonry helps in the co-ordination of window and door units by eliminating the necessity of cutting masonry to fit. A great deal of additional work is needed to develop acceptable Modular door sizes.

WATERMAN, FUGE & ASSOCIATES, Architects

In general, manufacturers of building materials have not made any significant move to Modular co-ordination of materials and many of those who have, have not done well enough to be of real help. For instance, with masonry construction, the net window opening should be $\frac{3}{8}$" or $\frac{1}{2}$" larger than the indicated dimension, but the steel window people make their windows $\frac{7}{8}$" wider. This inevitably leads to "stealing" by the mason and negates the theoretical advantages of the system.

KNIGHT & VAN TEYLINGEN, Architects

tighter cost-estimates

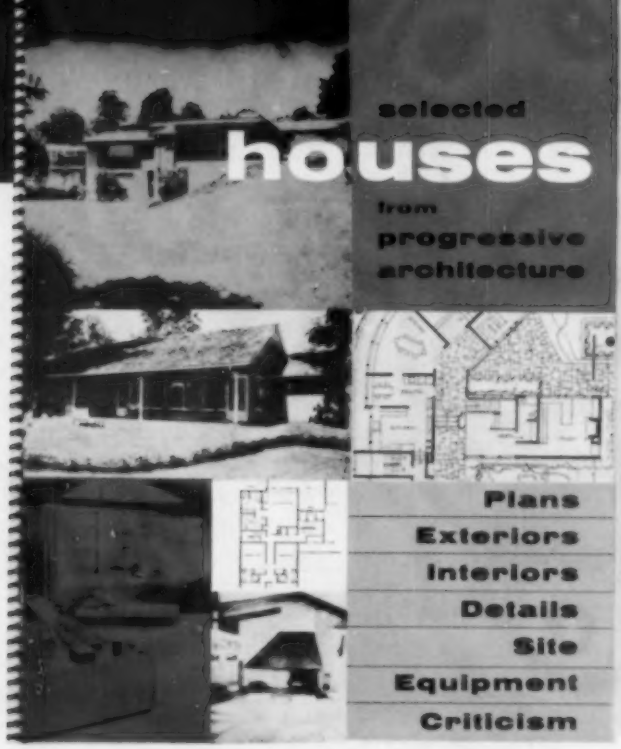
Our preliminary cost-estimates are almost always within five percent of acceptable bids. Contractors comment about our clear and simple detailing.

MAUREY LEE ALLEN, Architect

Generally, it is true that Modular Measure brings tighter cost-estimates.

DRAKE, TUTHILL, CONVERY & CUEMAN, Architects

(Continued on page 274)



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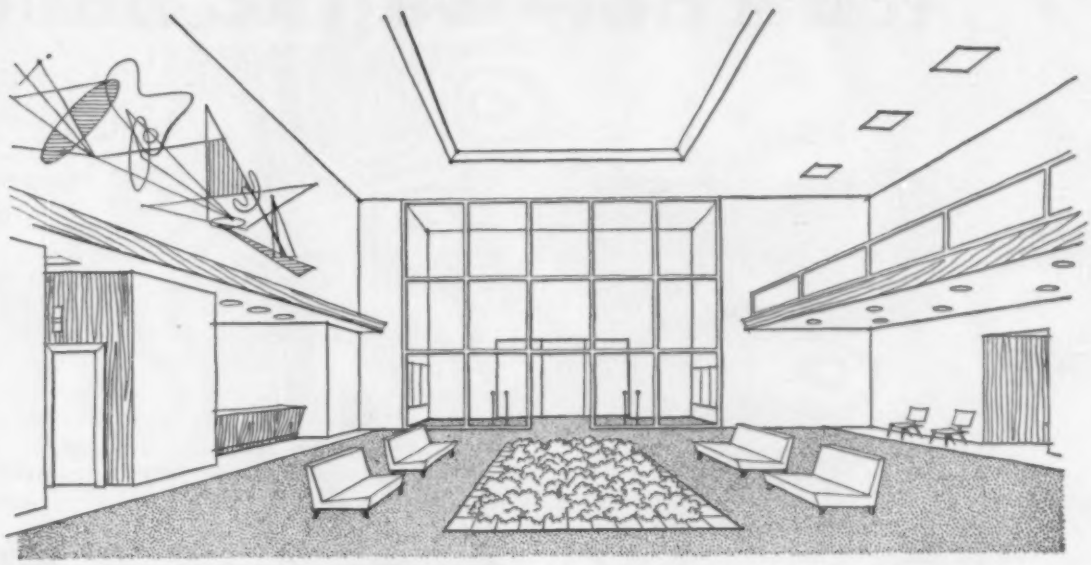

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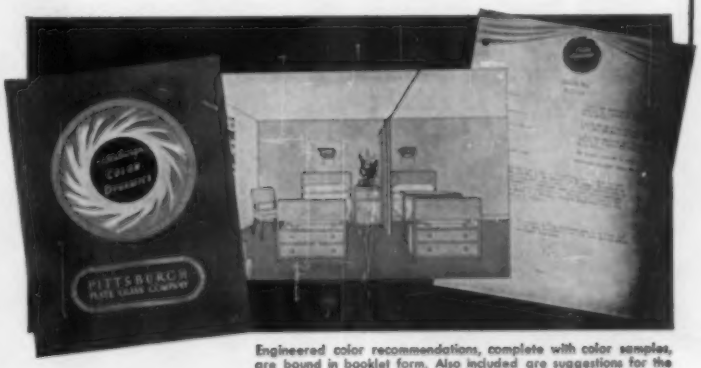

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Each piece, each panel arrives prime coated. Not on the face only . . . on face, ends, edges, in grooves on grooved panels; and back primed. Finish painting goes rapidly and economically.

It's the new, man-made successor to wood siding. It offers you new design factors. It's a new way to build. Want details? Write us — Insulite, Minneapolis 2, Minnesota.

New INSULITE® Primed Siding

***Insulite,** made of hardy Northern wood.* Insulite Division of Minnesota and Ontario Paper Company, Minneapolis 2, Minn.

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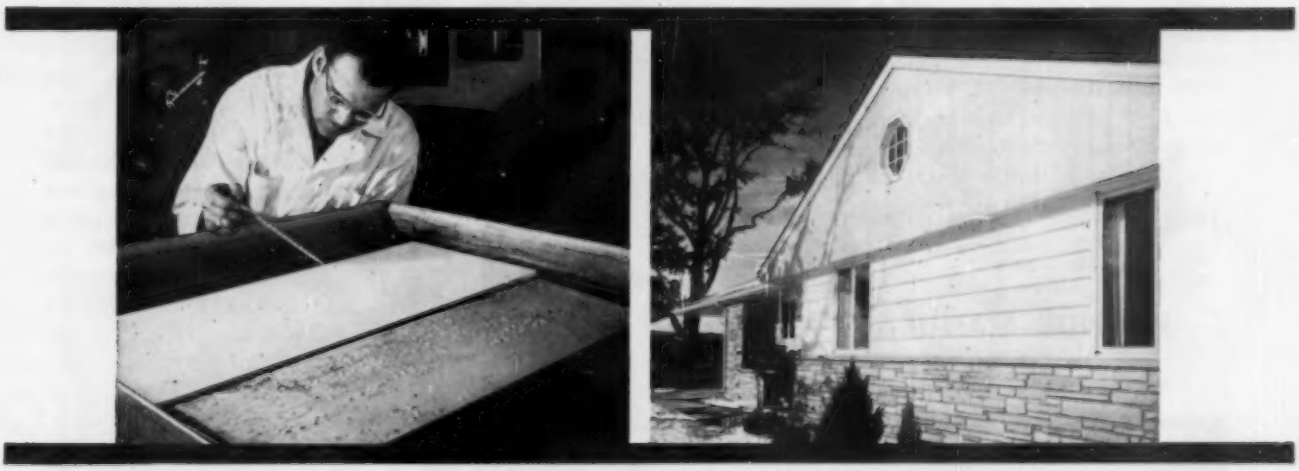

No more paint blisters? Experience to date indicates that new Insulite Primed Siding has exceptional resistance to paint blistering. In laboratory test shown above, moisture has bubbled and blistered paint on ordinary siding (in foreground), while Insulite Primed Siding (at back) shows no trace of blistering.

New sidewall beauty and fresh, attractive new design ideas come naturally with Insulite Primed Siding. Twelve-inch width of horizontal siding gives full 10¾″ exposure—a de luxe effect. Vertical grooved panels (grooves 8″ o.c.) and board-and-batten treatments with plain panels allow nice blendings and contrasts.

Here's a multiple demonstration (*left*) of the great new features of Insulite Primed Siding, and a showing of the three types available. Men in foreground, working a length of horizontal siding, demonstrate fast, clean sawing and full, true dimensions without scantage. Horizontal siding comes in 8′, 12′ or 16′ lengths. At top, carpenter applies batten strips to plain 4′x 8′ panel. Left, painter shows excellent coverage of paint on primed surface of vertical grooved panel.

Problem: to install a loading platform door that would follow roof lines and allow more headroom for inside operation of a fork lift truck

RAYNOR
OVERHEAD DOORS
solve your most difficult Installation Problems

RAYNOR
Inclined Track
DESIGN FOR GREATER HEADROOM CLEARANCE

When planning this warehouse, management specified that doors to the loading platform should allow for operation of a fork-lift truck, both inside and out. Raynor's engineering staff was consulted and a special inclined track was suggested. Using this, the Raynor overhead door travels up and out of the way, following contours of the roof line. Look to Raynor for quality-constructed doors—let Raynor solve those "problem" installations.

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modular measure

(Continued from page 270)

quicker layout at the site

The first time a contractor lays out his building to a gridline, instead of to the actual corner of the masonry, he is sure that we have gone berserk, but, before he has gone very far, he will admit that the idea is sound.
DONALD M. SCHOEPKE, Architect

Contractors have told us time and time again that, using Modular Measure, the layout on the site is greatly simplified. The head of our supervision department says it has been at least a year since the contractor, subcontractor, or supplier has called requesting an explanation of Modular Measure.
MAGNEY, TUSLER & SETTER, Architects

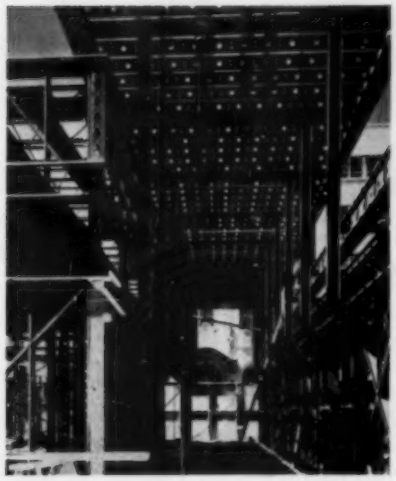
So far, it has not been our experience that the system makes for quicker on-the-site layout. However, we feel that this is not the fault of the system, but rather the lack of education in Modular Measure by the contractor. This condition should become reversed as more of the men of the job become familiar with it.
CONRAD & SIMPSON, Architects

About 1950, we designed the Electrical Engineering Building at Iowa State College using Modular Measure. At the outset of the project, we sat down with the contractor and all of his key men to explain the new system. The contractor accepted it with an open mind as a possible improvement in construction, modular brick was used, and there was no open resistance on the part of anyone. Throughout construction, there was continuous confusion caused by the dots and arrows. Undoubtedly, the workmen could eventually be taught how to use the system, but the benefits did not appear to outweigh the disadvantages and we abandoned Modular Measure.

We have been active in developing techniques for prefabricating elements of buildings and have found rewarding economies thereby. We

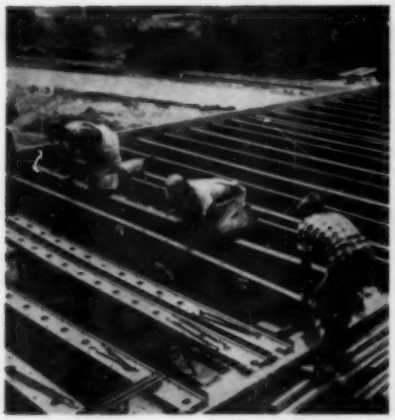
(Continued on page 278)

Why more and more architects specify LIGHTSTEEL..



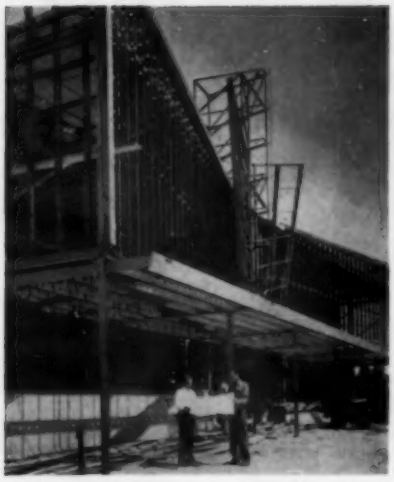
FRAMING FOR PONCA CITY SAVINGS AND LOAN ASSN.

ARCHITECT: Robert E. Buchner, A.I.A., Tulsa, Oklahoma



FLOOR SYSTEM FOR SHIRLEY PARK APTS.

ARCHITECTS: Corning and Moore, Washington, D. C.



FACADE AND MARQUEE FRAMING FOR PUBLIX MARKET

ARCHITECTS AND ENGINEERS: Southeastern Engineering Co., Clearwater, Florida

for light occupancy buildings like these

Shown here are three of the many buildings where Penmetal LIGHTSTEEL structural sections have proved their economy and versatility. In each case, alternative methods of construction were thoroughly investigated before LIGHTSTEEL was chosen.

The Ponca City Savings & Loan building required a variety of collateral materials to achieve the attractive appearance of the structure. LIGHTSTEEL nailable joists and studs, used for wall, floor and roof systems, made attachment of finishes simple and economical.

Use of the LIGHTSTEEL floor system cut 55% from the insurance rates for the Shirley Park apartment development. Ease of handling and erection speeded construction.

LIGHTSTEEL was used for the Publix Market building because the resultant light facade afforded considerable savings in structural steel. Here again, speed of erection was also an important factor.

Send for further details of any of these projects. Also ask for a copy of the latest LIGHTSTEEL catalog, SS-22. No cost or obligation.

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uses Youngstown Steel Pipe

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(A Vincent Astor-Brooks, Harvey & Company enterprise)
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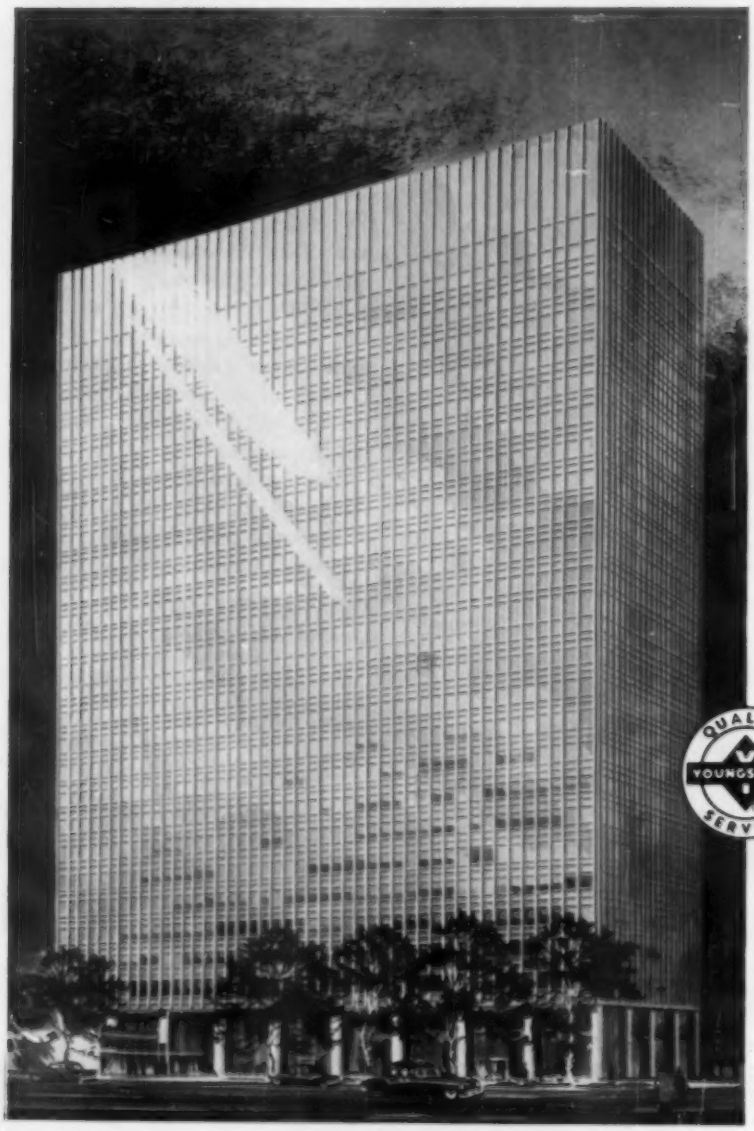
Architect: Carson & Lundin, New York, N. Y
General Contractor: George A. Fuller Company, New York, N. Y.
Structural & Mechanical Engineers: McGeorge Hargett & Associates
Consulting Mechanical Engineers: Jaros, Baum & Bolles
Heating & Air Conditioning Contractor: The Feldman Bros. Company, Cleveland, Ohio
Distributor: Grinnell Company, Cleveland



Cleveland's newest architectural beauty — this modernistic 22-story Illuminating Building — will provide much-needed air-conditioned office space for the "Best Location in the Nation". Owner of the new structure, 55 Public Square, Inc., and the architects, wisely chose Youngstown Steel Pipe to provide for a long-lived, dependable water supply system.

Youngstown Steel Pipe is the best pipe obtainable—anywhere. That's because it's made from our highest quality steel by men who have devoted their lives to the pipemaking business. Each and every step in Youngstown's completely integrated operations is closely quality-controlled by expert metallurgists to guarantee pipe that will meet your most exacting specifications.

Your nearby Youngstown Pipe Distributor has complete and ample stocks in all sizes. Why not call him today and discuss your requirements?

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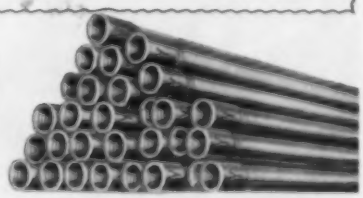

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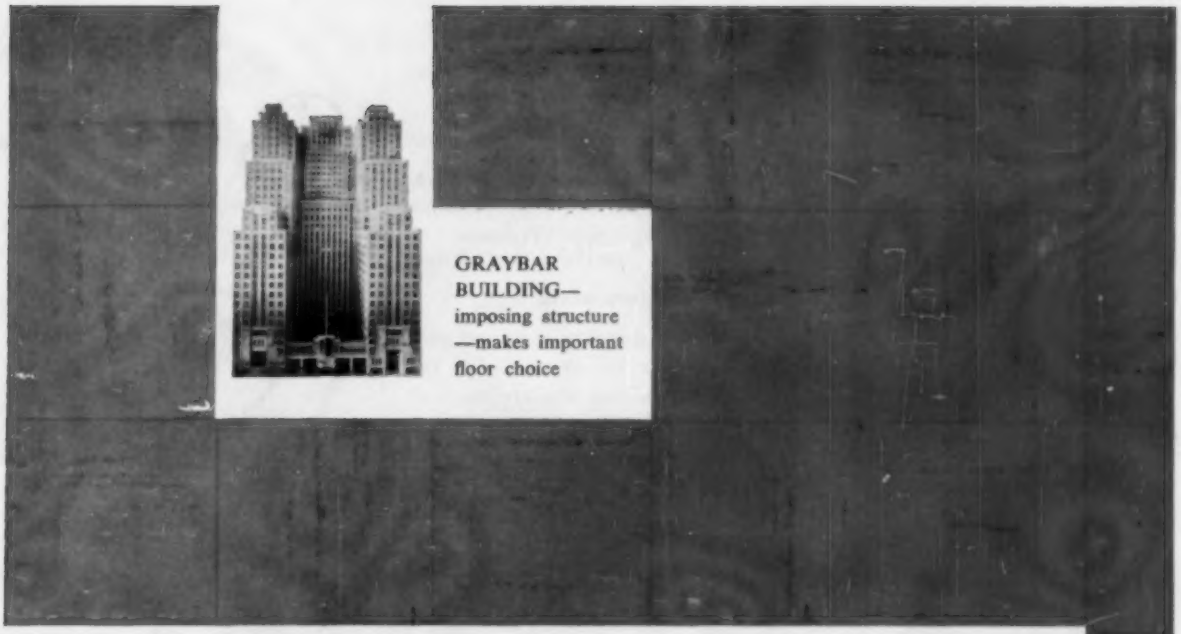

GRAYBAR BUILDING—imposing structure—makes important floor choice

Webb & Knapp chooses **B.F.Goodrich**

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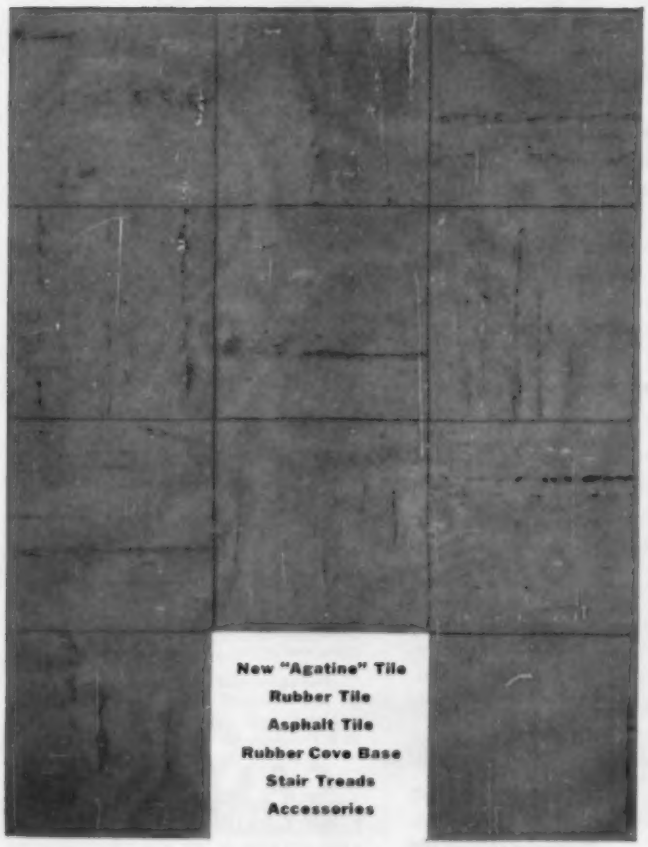
VINYL FLOOR TILE

for New York's Graybar Building



New "Agatine" Tile
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Stair Treads
Accessories

Keeping floor maintenance costs down is a primary concern of anyone running a skyscraper. That's why Webb & Knapp, who own and operate some of New York's biggest buildings, chose B. F. Goodrich Koroseal floor tile for busy corridors in the mammoth Graybar Building. Koroseal actually cleans in half the time, needs less people to take care of it. Koroseal needs no extra surface finishes (it has "built-in lustre"). A simple washing or buffing keeps it looking good as new. In fact, the more it's walked on, the better it looks! For any building, large or small, specify B. F. Goodrich Koroseal floor tile . . . and save your client a lot of money.

SPECIFICATIONS: 31 new, distinctive colors (1/16", .080 gage and 1/8" thicknesses), can be used on, above or below grade.

FOR FURTHER INFORMATION: See Sweet's or write B. F. Goodrich Flooring Co., a Division of The B. F. Goodrich Company, Dept. PA-11, Watertown 72, Mass.

B.F.Goodrich

ANOTHER EFFICIENT WOOD PRODUCT

New 16-page booklet, for designers, covers the how and why of

CLEAR SPAN WOOD ROOF TRUSSES

built with TECO Connectors, that are strong, economical, and durable.

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- *Unobstructed* views in assembly places, such as CHURCHES and SCHOOLS —
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There's a wood roof truss for just about any type of building. For proper selection, be sure to refer to "Clear Span Wood Roof Trusses." Send today for FREE COPY.

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Please send free copy of "Clear Span Wood Roof Trusses."

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modular measure

(Continued from page 274)

are not unwilling to try to improve, but we do not feel that Modular Measure leads in that direction.

BROOKS-BORG, Architects

reduces masonry costs

We feel that masonry costs are definitely cheaper, however, only in the case of contractors who are familiar with and understand this system. We have been told by contractors after completing a Modular project that their masonry unit costs were lower than they had anticipated, and credit was given by them to the use of Modular Measure. These contractors required less layout time, and a minimum of cutting and fitting; they found detail construction simpler.

SMITH, TARAPATA, MACMAHON, Architects

Masonry work is not at all cheaper, nor is its quality improved, with Modular dimensioning. An unskilled mason can't possibly do a better job than he could otherwise—except for the number of bricks he may cut. Our experience has indicated that he knows very little about the system and is not overly interested in more than a place to start and a point to stop. Not always do we have an appropriate brick of the right color and texture selected that is Modular; consequently, the mason is no better off than before.

SARGENT, WEBSTER, CRENSHAW & FOLLEY, Architects

requires no compromises

Architectural freedom and design have not been impaired because of Modular Measure; in fact, it presents *a new concept of design with controllable materials.*

WALKER, NORWICK & ASSOCIATES, Architects

We do not have a job which has been completely laid out in Modular Measure. Periodically, we assigned someone to research the project through and apply it to a job; however, about half-way through, so many conflicts arose that we abandoned the system and have not tried it for approxi-

(Continued on page 282)

WHY DIDN'T THEY GET WINDOWS WITH CALDWELL BALANCES?!

The doctor probably can't answer that one . . . but he does know that windows which are always falling or sticking are an exasperating nuisance. And the maintenance crew knows how much extra time it takes to keep them in any semblance of working order . . . all reflected in high overall operational costs which plague the administrator every month, year after year. There is no practical substitute for the quality window with Caldwell Sash Balances.

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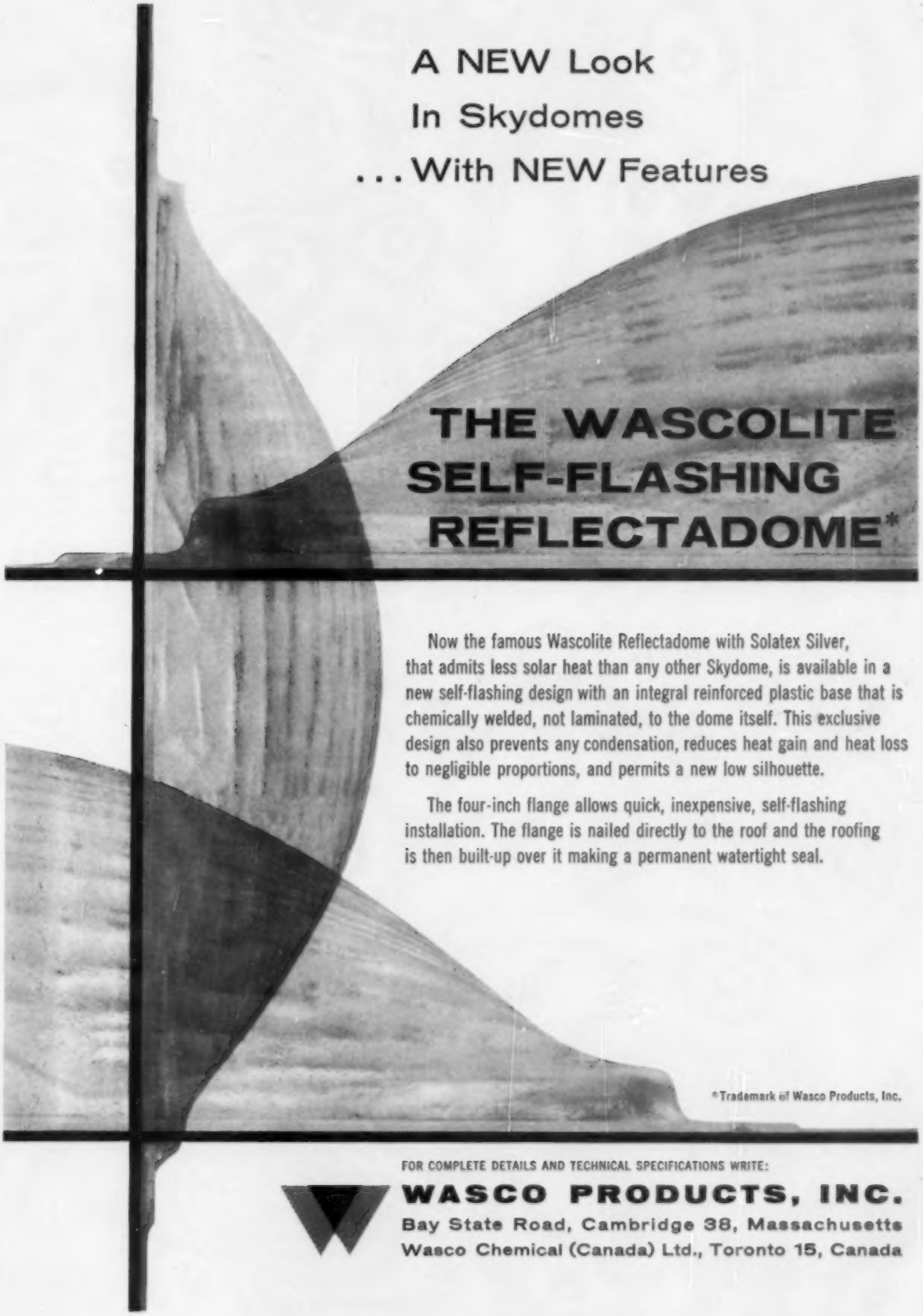
...With NEW Features



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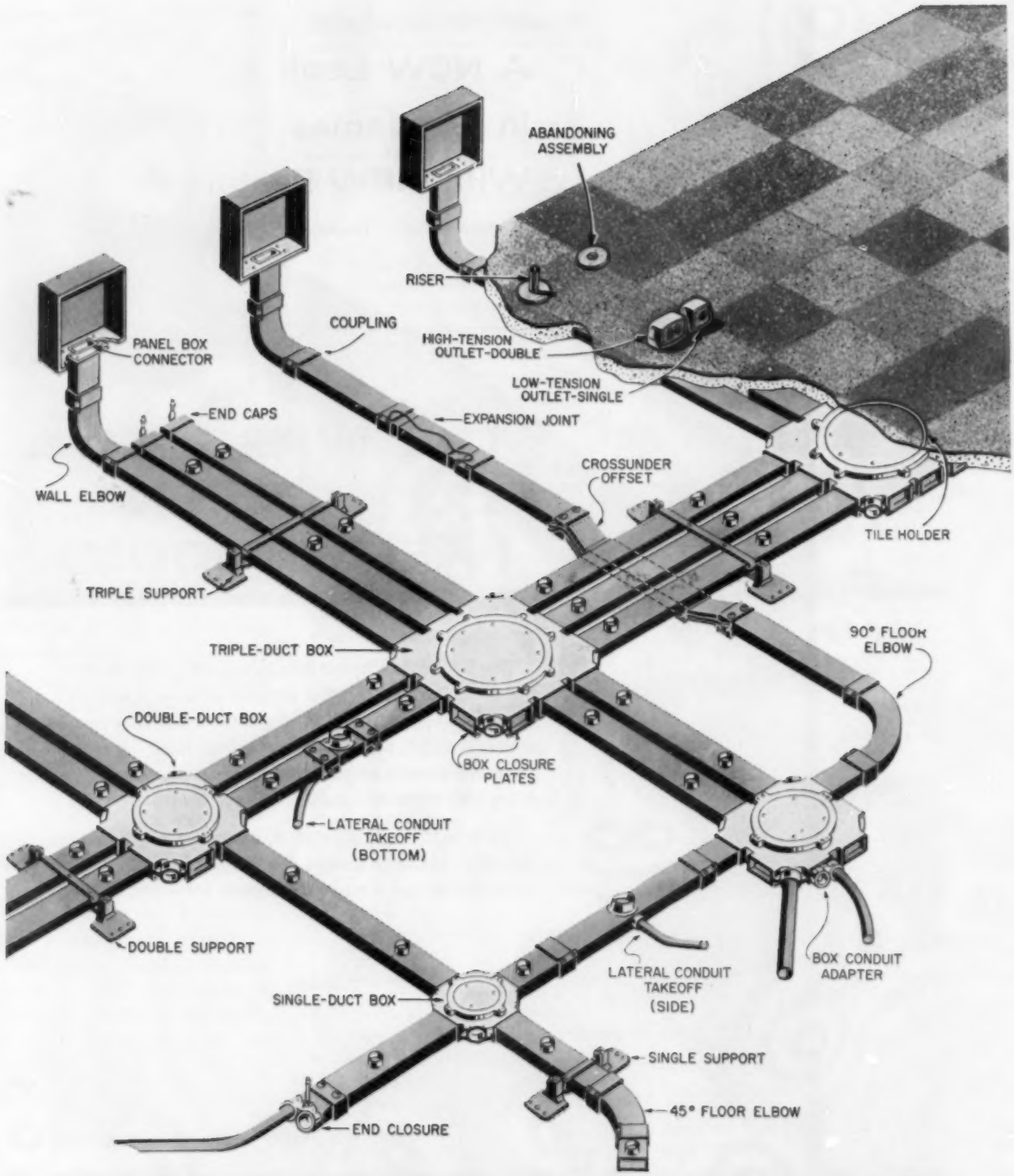

General Electric's new single-level steel underfloor wiring system provides a low-cost but efficient means of handling both feeder and branch circuits. The simple, flexible design permits installation under any conventional floor layout without special adaptations.

These new, attractive surface fittings are available for both the new G-E single-level and the G-E two-level steel underfloor duct systems. The modern styling with low silhouette was designed especially to blend with the modern interiors of today's buildings.

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NEW SINGLE-LEVEL STEEL

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For all types of floor constructions . . . can be used in fills as shallow as 2½ inches

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This addition to the G-E line of steel underfloor systems is designed for standard floor layouts where the greater flexibility of the two-level system is not required, or where fills are too shallow to accommodate other systems.

General Electric engineers have designed this system for easy installation—box and duct leveling is done quickly with a screw driver . . . slip couplings simplify duct connections . . . and wire pulling is a fast job because the galvanized ducts have smooth, organic-coated interior surfaces.

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All three General Electric steel underfloor wiring systems are listed by Underwriters' Laboratories, Inc.

When to Use the G-E Single-level System

Consider these factors before choosing an underfloor wiring system for your next project: a. Can a standard floor layout handle feeding and distribution? b. Is the floor fill less than 3½ inches? c. Can a single-level system fulfill future wiring requirements?

If so, you should consider this new General Electric single-level steel system. However, for other applications investigate G-E cellular-steel floor and two-level systems. Whatever your needs, General Electric's experience and complete product line can provide your best answer. Call your nearest General Electric Construction Materials district office or write Section C77-1168, Construction Materials Division, General Electric Co., Bridgeport 2, Conn.

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modular measure

(Continued from page 278)

mately one year. We had made several attempts to use the Modular increments, only to find that—in the beginning — the Modular masonry units were not available. Later attempts resulted in frustration because the 4-ft and 4-in. modules often did not lend themselves to the subtleties of detailing often required.

THORSHOV & CERNY, INC., Architects

MODULAR ASSEMBLY sources of quotations

Page 117

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Robin Boyd—from manuscript, "While Architecture Lasts" (see above).

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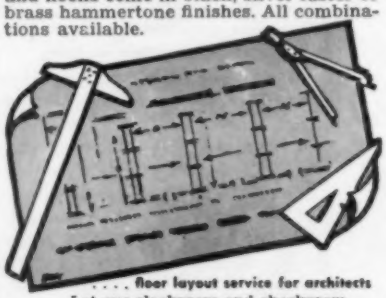

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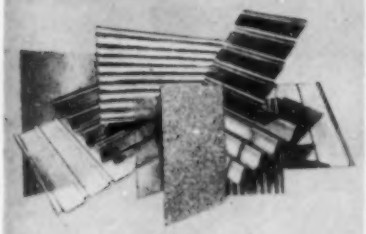

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p/a reviews

books received

Japanese Temples and Tea-Houses. Werner Blaser. F. W. Dodge Corp., 119 W. 40 St., New York, N. Y., 1957. 156 pp., illus. $12.75

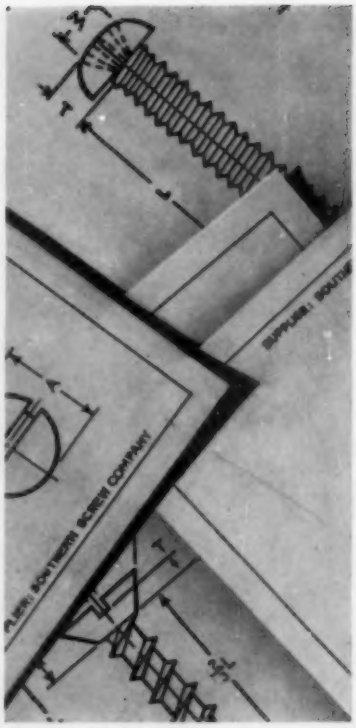
control of sprawl

Sydney's Great Experiment: The Progress of the Cumberland County Plan. *Denis Winston. Angus & Robertson, Sydney, Australia, 1957. 146 pp., illus. 37s. 6d.*

Australia is a country that in some ways resembles our own Northwest, in that it became metropolitanized before it became generally urbanized; hence it contains a few large cities, set over against a hinterland still in a primitive state, and these cities, including Sydney, have been growing and sprawling during the last decade in a fashion that calls for drastic measures if this growth is not in itself to undermine their genuine reasons for existence. The problem set by Sydney's concentration and sprawl is now shared by metropolitan areas all over the world. This gives Professor Winston's account of Sydney's County Planning Scheme a certain relevance for both planners and citizens in every other region. In its approach and handsome presentation, this book is in the excellent tradition established by the late Sir Patrick Abercrombie: it begins with a compact survey of the physical site, the economic situation, and the political forces—an absence of self-government was a negative one—that shaped Sydney and made it a metropolis. The first step in the development of an adequate plan for Sydney was the establishment of a planning authority over an even larger area, the county; and Winston makes it quite clear that this, too, will be inadequate, in the face of Sydney's continuous growth, unless measures are quickly forthcoming to distribute the increasing population over a still wider area.

Winston puts forth the case for

(Continued on page 288)



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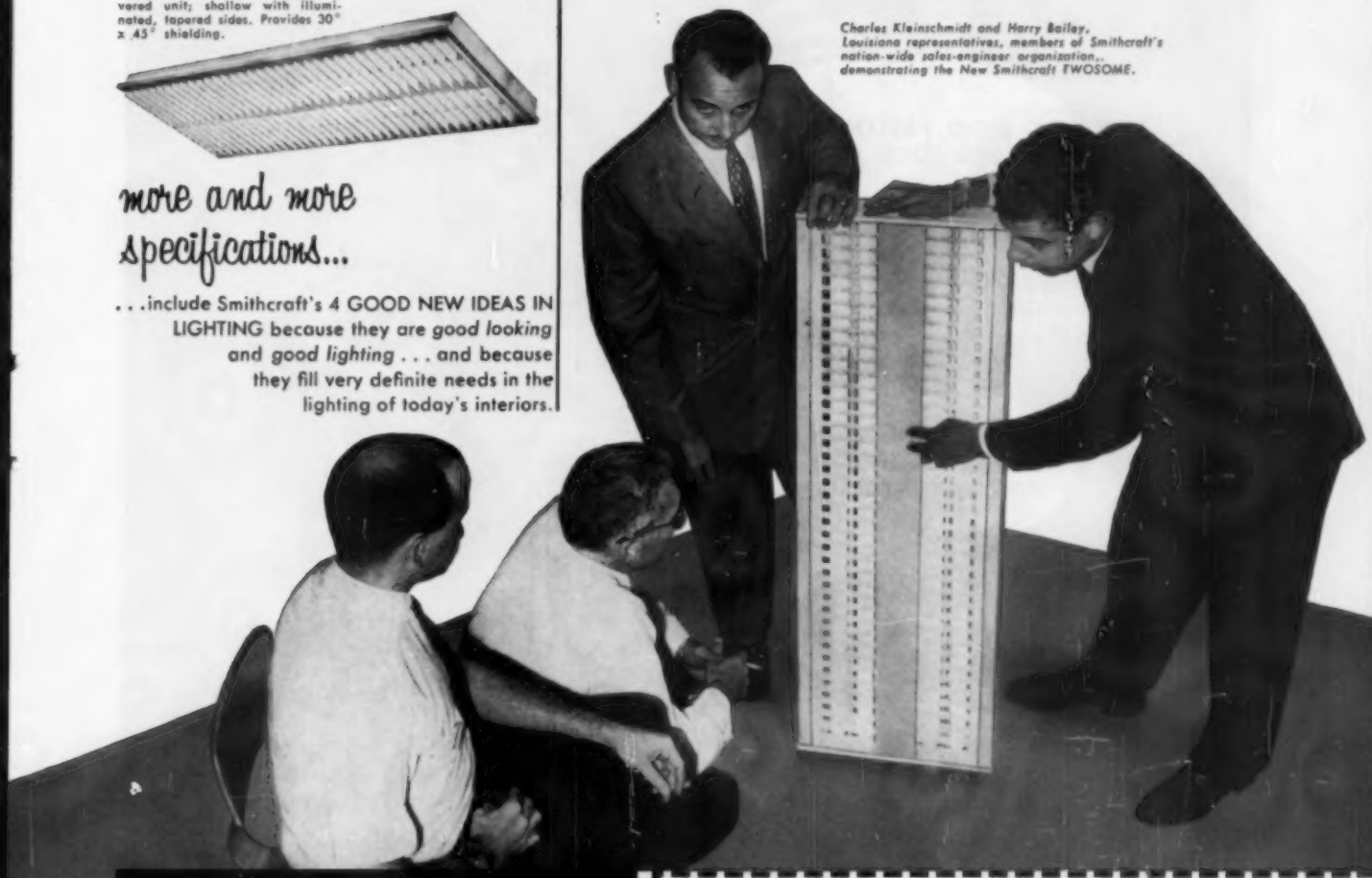

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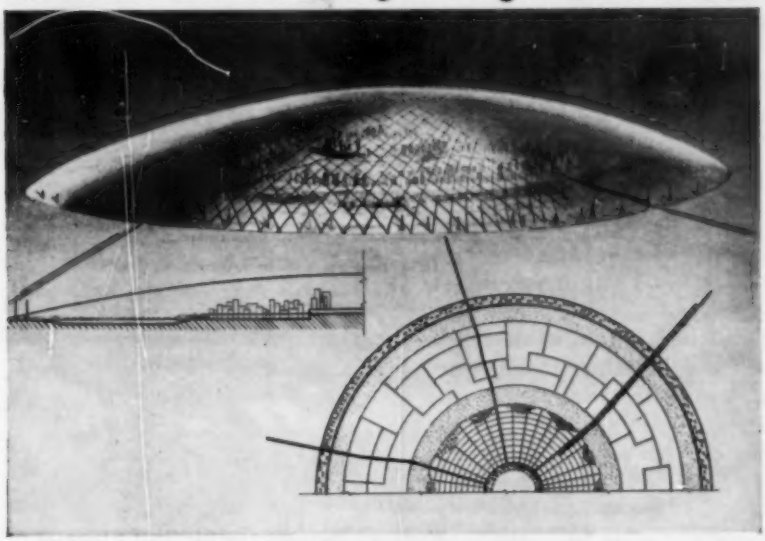

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Philip H. Seligson, New York designer, one of the winners in the 1957 MARS Contest. Mr. Seligson's project, "21st Century City," is featured in the MARS presentation on this page.

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The subject can be almost anything—aviation, space travel, autos, trains, buildings, engineering structures, household items, tools, machines, business equipment, etc. Projects will be selected on the basis of appeal to design-minded readers, broad interest, attractive presentation. Do not submit a design that is in production. In fact, the project does not need to have been planned for actual execution. It should, however, be either feasible at present or a logical extension of current trends. It cannot be unrealistic or involve purely hypothetical alterations of natural laws.

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reviews

(Continued from page 284)

broad planning in a persuasive, objective way, conscious of the fact that the situation demands even bolder measures than those that brought the County Plan into existence: but aware, too, that the conflict of interests and pressures in a democracy often makes it necessary to accept half a loaf, when only a whole loaf will really go round. Apart from the intrinsic interest of the data about Sydney's origin and development, what means most in such a report, to an outsider, is the conclusions that the author draws. The prime conclusion is not merely that control of population settlement is essential, but that the instrument for exercising such a control is the establishment of a physical barrier, in the form of a greenbelt. Ebenezer Howard's great contribution to the concept of the Garden City is now being recognized by town planners everywhere as a universal method for delimiting an urban area. But a greenbelt is only a firebreak; it does not by itself put out the fire. In urban areas today, that fire is the sudden increase in population. In 1944, Australian demographers expected Australia's population to reach a maximum of 8,500,000 by 1970: but as early as 1954 it had already passed the nine million mark. Sydney, which was supposed to have 2,227,000 by 1972 already has almost two million. As Winston points out, no planning on a county basis can handle such a prospective increase: nothing short of a New Towns policy, for building up new centers and enlarging existing decentralized facilities, will make it possible to accommodate so many newcomers, without lowering the quality of urban life. These conclusions carry weight as coming from a distinguished planner and administrator; and they should remind American readers that equally bold proposals will be necessary to cope with our even vaster problems.

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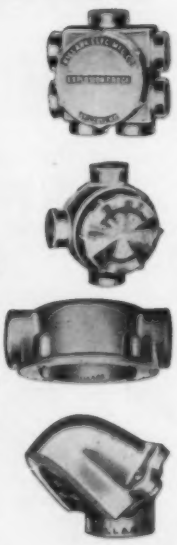

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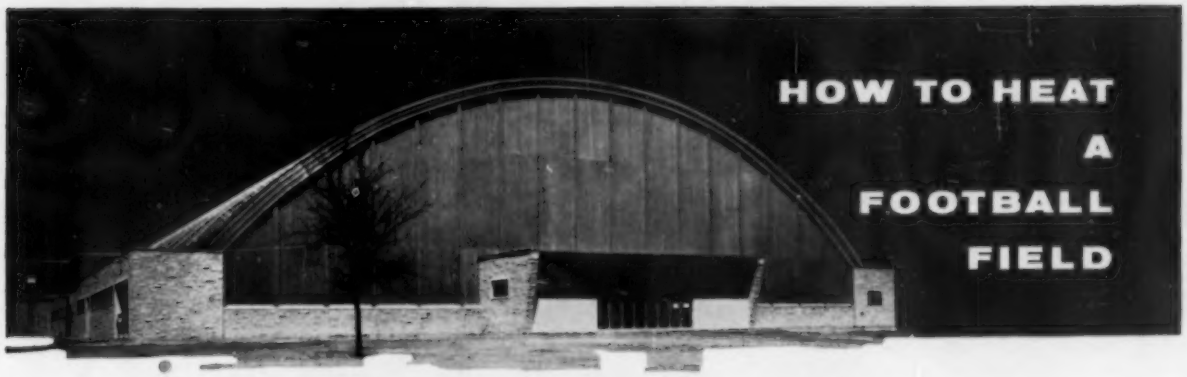

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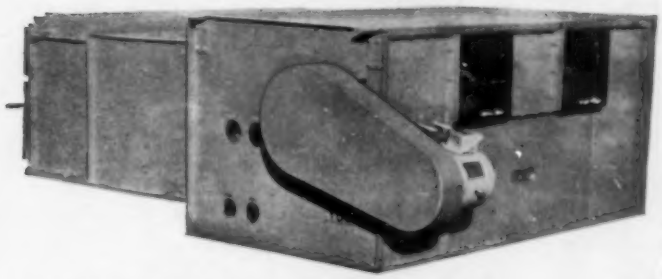

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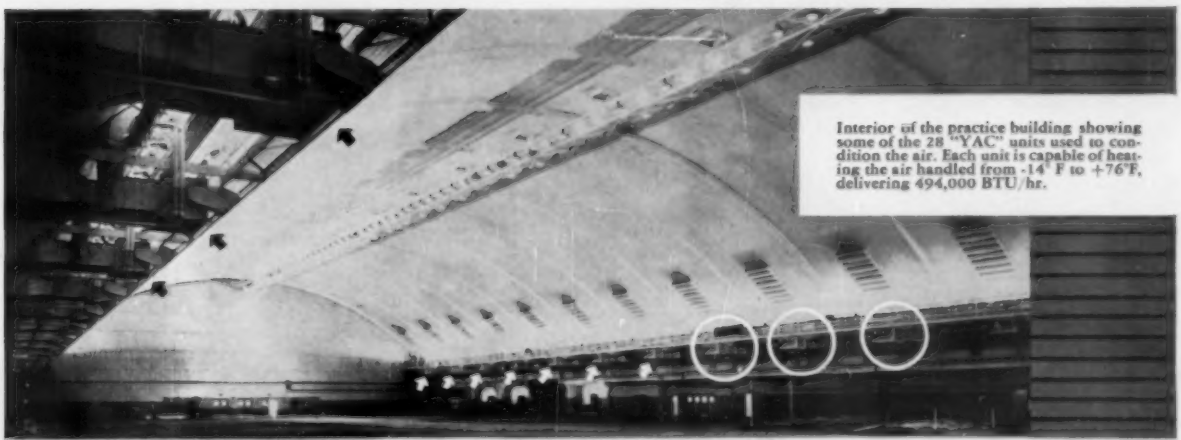

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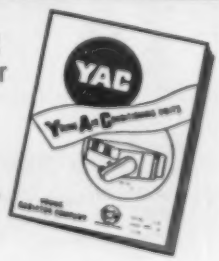

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(*Continued on page* 296)

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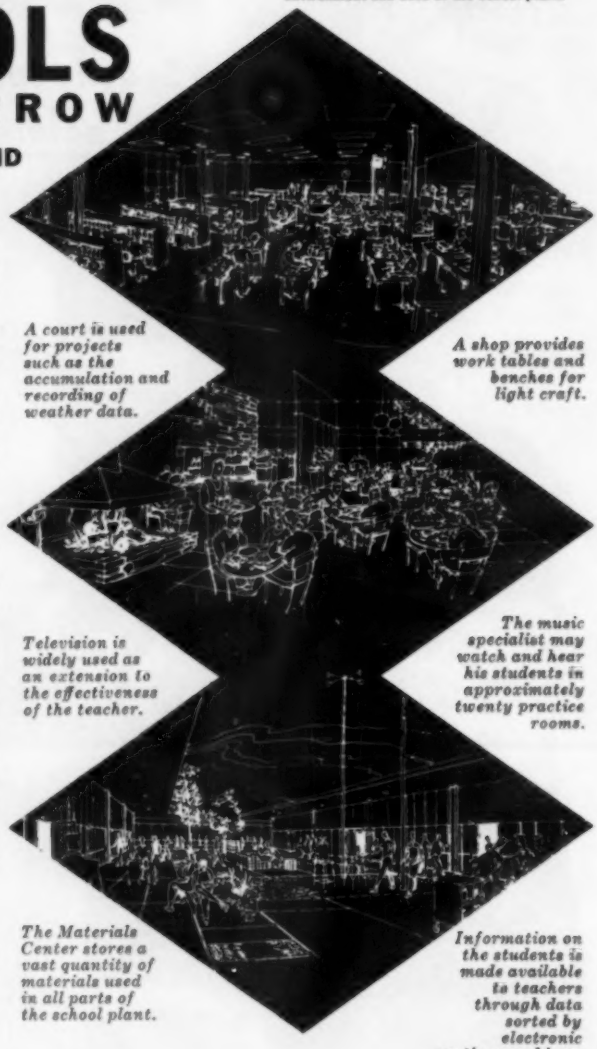

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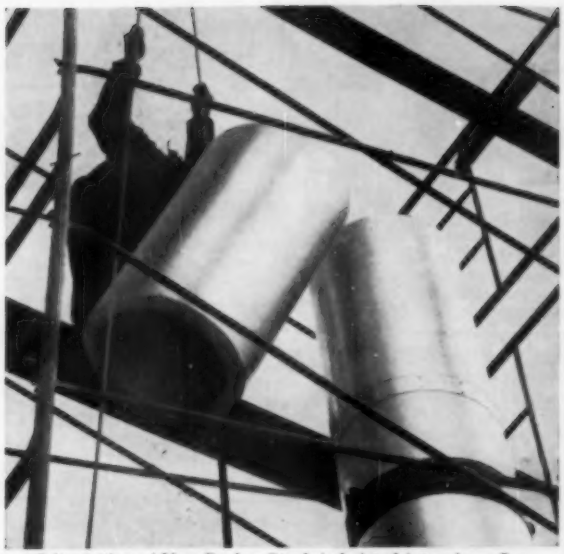

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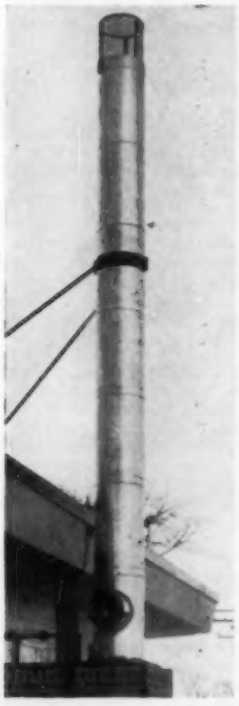

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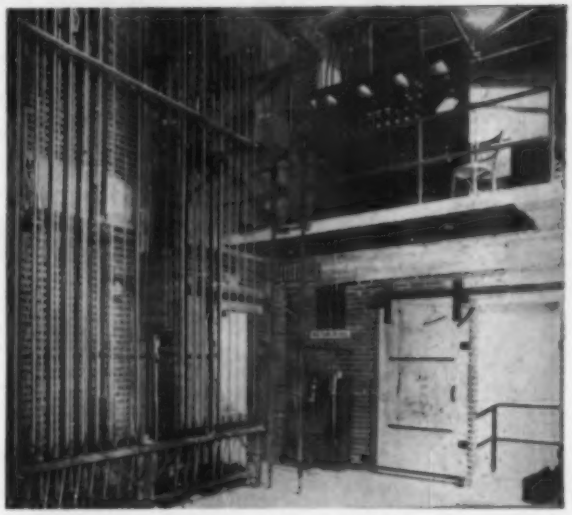

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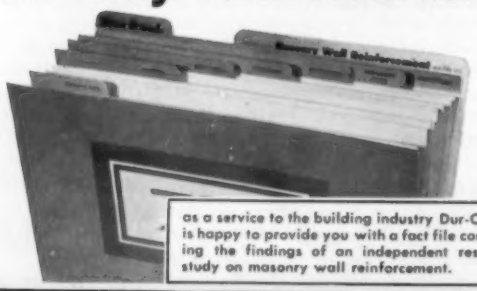

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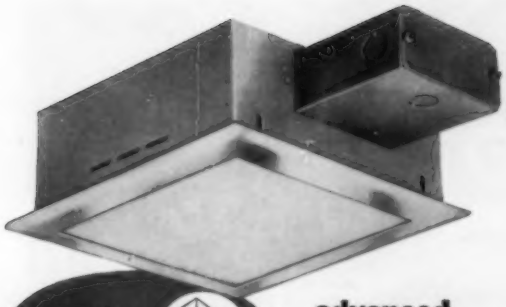

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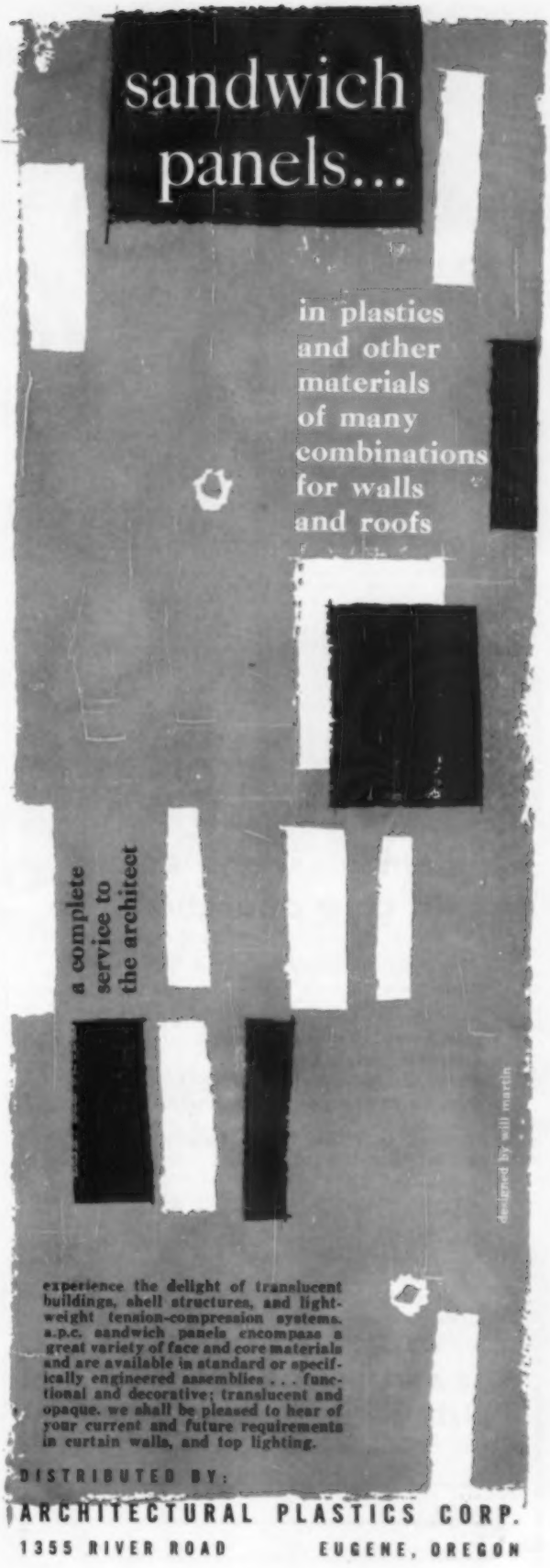
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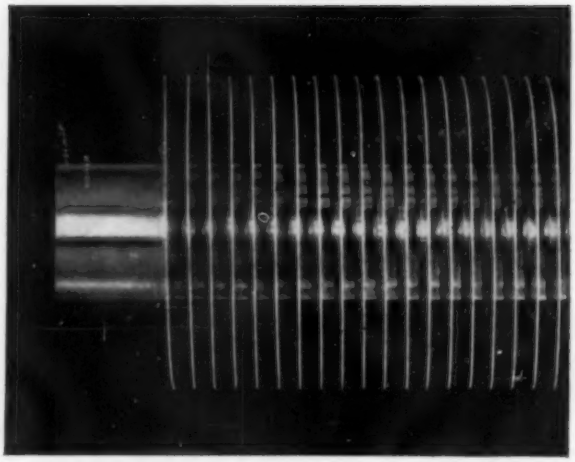

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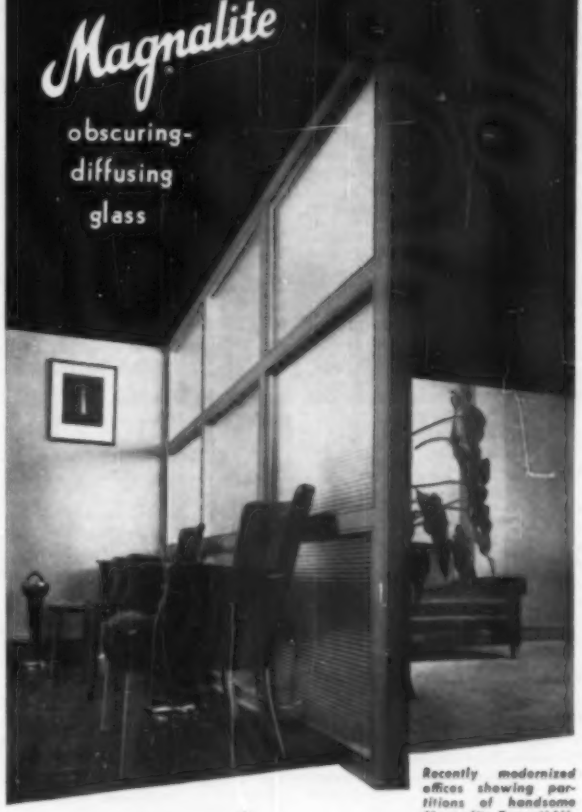

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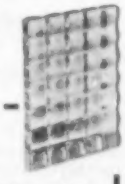

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P.S.

who designs building products?

The subject of this issue of P/A—MODULAR ASSEMBLY—opens so many avenues for further discussion that ramifications of the topic seem endless. Any one of the attitudes about design results expressed in the introduction could be amplified and be the subject of a useful study. And in the brief quotes from much more lengthy, thoughtful statements from producers there are again many points of view hinted at, which might be further pursued.

For example, with all the wordage in this issue, little if anything has been said about a very important subject: the *technique of design* of the modular components used in a MODULAR ASSEMBLY. What sort of design talent does—or should—the producer use: industrial designer, architectural designer; his own design staff, consultants? What are the criteria that are used in design: theoretical ones; factory and laboratory tests; consumer reaction tests; use in test buildings; architectural experience? In what way does the producer determine the esthetic-functional co-ordination: is the innate esthetic nature of a material or its function studied, or is there a superficial form-adoption—"streamlining"?

Some producers and some Associations of producers can reply proudly that they have good answers to these questions, in the form of research projects using architectural advisors and sometimes architectural school facilities, combining the knowledge of their own technical specialists and the understanding of the men who will specify the final result and design it into buildings. Many others, however, must admit to a purely arbitrary design approach (the "let's hire that famous designer over on 62nd street" can be just as arbitrary a decision as the "let's see what the boys in the styling division can do with this one" method of handling product design problems).

It's an important problem, and as the *assembled* building grows as a concept (which architects, producers, and builders believe it must) design of the parts to be assembled will become ever more important. This issue is primarily concerned with the *modularity* of those component parts—their innate assemblability, so to speak. Here, it seemed to us, is where the first improvement needs to be made and understanding reached. But after that, there are many aspects of performance, function, and appearance that should be studied jointly by manufacturer and specifier.

I remember some years ago attending an informal meeting called by Morris Sanders, not long before his death. I recall that Max Abramovitz was there, and Frank Giná, and Doc Kilham, and I forget who else; it added up to an impressive group of busy as well as design-conscious architects. Morris had an idea which was, briefly, that an organized group of architectural offices should make themselves available to producers of building products for research, development, and testing of new and improved items. A project—let's say development of a modular partition system—would be handled by one architectural firm through the first research and study stage; a selected group of the others would be called in from time to time for advice and consultation; the entire "organization" would periodically review each project. At an appropriate point, selected architects around the country would be asked to specify the newly developed product and thus test it under actual job conditions (Morris believed that with a large enough group, sufficient "guinea-pig" building clients could be depended upon). Again there would be a review, and finally a full report would be tendered the producer, or Association.

I felt then, and I believe now, that the idea was a sound one—in fact, a vitally important one. It never grew beyond that first meeting, partly because it needed a prime mover, and Sanders was increasingly unwell and inactive; partly because even the first, most elementary questions—was it ethical; should it be done through AIA or as a private enterprise; would enough architects of repute agree and find the time to act seriously as members—remained unanswered. I don't think that anyone who attended that gathering will mind if I now suggest that it's an idea which could be made usable by others.

•

The Annual Business Survey conducted by P/A is published this time *(page 57)* before the end of the year instead of in January, as our custom has been. This leaves our January issue free for full attention to the Design Awards results (and releases the Business Survey somewhat closer to the time of the responses). The Design Awards Jury has left for home, worn out after the longest and most difficult judgment in the history of that Program; and those of you who won Awards and Award Citations have been notified. It is too early to announce the place of the January Awards Dinner, but I can reveal that another Awards Seminar session will be held, in co-operation with another School of Architecture. More of that next month.

It is gratifying to find that the Business Survey responses indicate still-increasing activity in the architects' offices, even though it is spotty and some regions are less busy than others. One thing that fascinates me is the fact that apparently the size of office—average and median—is not appreciably increasing with the larger work load (assuming, as seems to be the case, that the larger average $ volume is not all accounted for by increasing construction costs). This must mean that efficiency is also improved; the same staff is turning out more work. Perhaps the trend toward Modular Measure (and accompanying simpler drafting techniques) and assembly of modular components (with simpler detailing problems) is already accounting for some of this? Certainly the number of responses which indicated "prefabrication of parts" or "assembly of standardized elements" as the most important factor in the period ahead was impressive.

Leafing through the replies to the questionnaire always gives one a sense of changing personnel as well as development. The man who writes across his return, "I am almost retired and only doing a little work these days," is more than balanced by the one that says, "We are a new firm with not much to report so far; give us time." The angry responses were very few this year: the man who believes "this crazy modern architecture" has ruined his practice in Georgian houses; the misanthrope who wants to know, "What business is it of yours how much work I do?"; the fellow who takes this opportunity to write an essay on the shortcomings of the architectural press (citing, as examples, things published not in P/A). I have a fine collection of these; I hope the writing of them did something good as release for the writers, for they will never be seen by any eyes but mine, and the statisticians who did the calculating.

Except for these very few, which are to be expected in a return so large, the responses are thoughtful, and useful. For your colleagues who also benefit from this estimate of architect-designed construction ahead, thanks for your intelligent co-operation.

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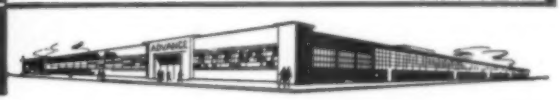

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